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Dear fellow Brazilian dermatologists,

In 2014 we have commenced Surgical & Cosmetic Dermatology's 6th consecutive year of publication, with the sentiment that its creation by the Brazilian Society of Dermatology's 2009-2010 Board of Directors—then headed by Dr. Omar Lupi—was a successful decision.

The flow of articles received by the journal has gradually increased since2009, putting the Editorial Board, at the closing of the 1st issue of 2014, in a considerably comfortable position for choosing excellent articles that focus on Dermatologic Surgery, Cosmiatry, and Diagnostic and Therapeutic Dermatological Procedures using new technologies.

From the outset, we have been careful to comply with the rules and recommendations for the indexations, and at the present the journalis ready to apply for indexation on the most prominent databases.

And the return on our efforts has been very positive, mainly due to the growing interest in these areas of Dermatology and the emergence of young, enthusiastic, and talented authors.

We would like to thank SBD's Accredited Dermatologic Services and the authors who work in private practices for their constant collaboration. We would also like to thank our tireless peer reviewers.

We are reaching sufficient maturity and stability to allow us to aspire to a promising future for the S&CD—a journal as contemporary as the subjects it seeks to study.

Dra. Bogdana Victoria Kadunc
Scientific Editor
Surgical & Cosmetic Dermatology

Deep phenol peeling: how to control pain during application and during the twelve hours following?

Peeling profundo de fenol: como controlar a dor durante a aplicação e até 12 horas após?

ABSTRACT

Deep phenol chemical peeling with the Baker-Gordon formula is indicated for the treatment of severe facial aging. A review of pertinent literature on its main limiting factor—pain— was carried out with searches on two databases (PubMed and Cochrane Library) using the following keywords: chemexfoliation, peel, peeling, and phenol, also cross-referencing with the terms anesthesia and analgesia. The search resulted in 151 articles that contributed little to clarifying what would be the ideal approach for managing pain when using a deep chemical peel with the Baker-Gordon formula. As a result, for this procedure, the authors basically relied on the expert experience—in this case, that of the anesthesiologist—which has been described. Therefore, further studies should be carried out in order to achieve a higher level of scientific evidence.

Keywords: chemexfoliation; phenol; anesthesia; analgesia.

RESUMO

O peeling químico profundo de fenol com a fórmula de Baker e Gordon tem indicação para o tratamento do envelhecimento facial severo. Sendo seu principal fator limitante a dor, realizou-se revisão da literatura pertinente ao assunto, com buscas em duas bases de dados: PUBMED e Cochrane Library, com as seguintes palavras-chave: chemexfoliation, peel, peeling, phenol, cruzando-se também com os termos anesthesia e analgesia. A busca resultou em 151 artigos que pouco contribuíram para o esclarecimento de qual seria a conduta ideal para controle da dor na realização do peeling químico profundo com a solução de Baker e Gordon. Assim, contamos basicamente com a experiência do anestesiologista aqui descrita. Portanto, novos estudos deverão ser realizados para alcançarmos maior nível de evidência científica.

Palavras-chave: *abrasão química; fenol; anestesia; analgesia.*

INTRODUCTION

Chemical peels consist of applying one or more exfoliating agents to the skin. Such agents are strong enough to result in the controlled destruction of the cutaneous tissue. Peels are classified according to their depth of action. While there are several classifications available in the literature, the authors consider the Lawrence, Brody and Alt's classification, which is based on the level of injury caused, the more instructive.[1] (Table 1) The depth to which the substance penetrates depends on its composition, concentration, and pH, as well as the amount of exposure time.[1,2]

Phenol or carbolic acid (C6H5OH) (Figure 1) is derived from coaltar and when in contact with the skin, produces coagulation and denaturation of the protein's of the epidermal keratin.[4,5]

Continuing Medical Education

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Table 1: Classification of the spectrum of chemical peels according to the depth of the lesion

Superficial lesion (up to the stratum granulosum: up to the papillary dermis)
Very light - Resorcinol, CO^2 de Jessner, Retin-A, 5-FU, alpha hydroxy acids, 10%-20% TCA (superficial TCA)
Medium-depth lesion (up to the upper reticular dermis)
Light - 35% TCA, not occluded, multiple or simple congelation
Combination of CO^2 + 35%-50% TCA, not occluded, simple or multiple congelation
Combination of Jesser + TCA, not occluded, simple or multiple congelation
Combination of 70% glycolic acid + 35% TCA, not occluded 50% TCA, not occluded (deep TCA), simple congelation
Total potency phenol (88%), not occluded
Deep lesion (up to the middle reticular dermis)
Baker's Phenol, not occluded

The use of phenol in dermatology began in the nineteenth century. In 1882, Paul G. Unna described the actions of salicylic acid, resorcinol, trichloroacetic acid, and phenol in the skin, establishing a reference for many other authors. 6 Mackee used phenol in peels for therapeutic effects in 1903. This British dermatologist published his studies when already a professor in the dermatology department at New York University, in 1952. 7 The use of phenol was developed in France after World War I. 8 In the 1940s, in the United States, Eller and Wollf carried out the first systematic study on the use of phenol, resorcinol, salicylic acid, and carbon dioxide criotherapy for treating scars. 9 In the 1960s, many formulas containing phenol were experimented with by dermatologists and plastic surgeons.

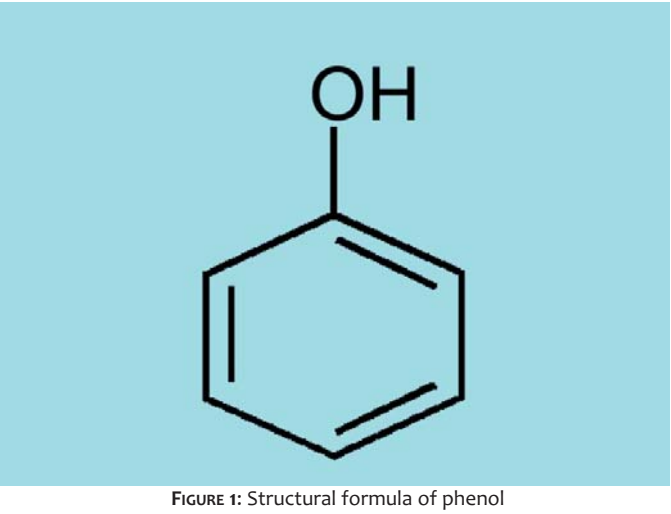

Figure 1: Structural formula of phenol

In 1961, Baker and Gordon described and detailed a phenol solution diluted in water and associated with croton oil and liquid soap, which to the present day is the most widely used in practice and the most frequently referred to in scientific publications on the subject. 10 Phenol peeling with the Baker-Gordon formula is indicated for the treatment of severe facial aging with deep rhytids and advanced alterations in the skin's texture. It remains among the most effective methods of chemical rejuvenation due to its effect on the remodeling of collagen fibers. It acts on the skin's color, producing a global whitening of the face. Histologically, the restructuring of the basal layer takes place, disabling melanocytes and inhibiting the transfer of melanosomes to nearby keratinocytes. 1An immunohistochemical study in rats that underwent medium and deep chemical peels showed an increase in the amount of collagen and elastic fibers. [11]

Phenol peeling seems to also be effective for treating pre-malignant and malignant lesions. Furukawa and Yamamoto applied deep phenol peel in a group of patients with an aim at treating skin cancer, and obtained a good response. The same study highlights evidences in the success of the treatment of superficial basal cell carcinoma, Bowen's disease and actinic keratoses. [12]

The theoretical effect of phenol peeling is directly proportional to its penetration into the skin layers. The absolute phenol (88%) immediately coagulates the proteins of the epidermis, which self-blocks its penetration, resulting in a medium peel.

The dilution of 2ml of phenol in 3ml of water—as in the Baker-Gordon formula—does not immediately cause coagulation of proteins in the epidermis. The phenol/water solution receives 8 drops of liquid soap and 3 drops of croton oil. The liquid soap acts as a surfactant (Surface active agent) i.e. it is a superficial activity agent that has the ability to alter the superficial and interfacial properties of a liquid or of its immiscible phases. It also has affinity for oils and water. It reduces the surface tension and allows the penetration of phenol into the skin.[13] Croton oil is derived from the seeds of the plant Croton tiglium and acts on epidermal vesiculation, allowing the penetration of phenol. The penetration depends, therefore, on the dilution of the phenol, on the association with the surfactant, on the vesicant agent, and on the occlusion, among other factors.

There is a time lapse of between 8 to 12 hours from the initial application of the Baker-Gordon solution and the onset of phenol in the nerve endings, when it plays its anesthetic role to halt the pain process.

The patient must therefore be kept comfortable throughout the application of the phenol solution and up to 12 hours after its completion.

Thus, the excellent therapeutic effects of this formula collide with painful discomfort during application and in the succeeding hours. The effective control of pain makes the procedure more secure, fast, simple, and easily reproducible. Therefore, standardized analgesia and sedation techniques are required to minimize the discomfort of the procedure and reduce patient anxiety.

OBJECTIVE

The present study was aimed at investigating what has already been published about analgesia/anesthesia for the purposes of phenol peeling using the Baker-Gordon solution, and seeking proposals for controlling the pain during and after the procedure.

METHODS

A search process was initially carried out on the PubMed and Cochrane Library databases, produced by the National Library of Medicine and the Virtual Health Library, respectively. The keywords used were: chemexfoliation, peel, peeling, phenol, with cross-references to the terms anesthesia and analgesia. Specifically, no articles that matched the search parameters were found for the intersection between the descriptors chemexfoliation AND phenol AND anesthesia OR analgesia.

The search strategy phenol AND peelingwas used on the PubMed database, which yielded 151 articles, including descriptions of the risks of phenol peeling, accurate indications, action detailed histologically, complications and their prevention, in addition to the approach of arrhythmias associated with the phenol peel. [1, 4, 11, 14, 15] Two articles addressed the authors' focus of interest, without, however, being specific: Yoon and Ahn recorded that all patients in the study underwent phenol peeling under deep intravenous sedation, and Edison suggests technical changes aimed at decreasing the pain. [16, 17]

A new search strategy was then used in the same database with the words: anesthesia AND peeling, which yielded 28 articles, some consideringthe use of topical anesthetic to perform superficial peeling and the use of anesthesia in fractional laser.[18, 19]

The following search was run in the second secondary sources database (Cochrane Library BVS), with the terms anesthesia AND phenol AND peeling, which did not yield references. Changing the terms for anesthesia AND peeling, one Cochrane record was found for controlled trials, which compared topical anesthetics in medium peels.[20]

Then a new search with the terms phenol AND peeling resulted in four references: two Cochrane systematic reviews and two Cochrane records on controlled trials.[20-23] Finally, a search was run with the terms analgesia AND peel and with the terms anesthesia AND chemexfoliation, which did not answer the authors' question. 23, 24 Therefore, the search run on the databases (PubMed and Cochrane) for articles addressing in detail the subject of pain during, and 12 hours after the application of chemical peels withthe Baker-Gordon solution, proved negative.

In fact, in the authors' daily dermatologic practice, a lower level of scientific evidence underpins the execution of the procedure, meaning that it is the experience of the specialist that comes into play, and in the present case this is the role of the anesthesiologist.

Conscious sedation

It was possible to comfortably carry out the procedure in question—for the medical staff and especially for the patient—using this type of sedation.

Conscious sedation has become a common practice in surgical and dermatological procedures.[9] It is defined as any degree of sedation that allows good perioperative anxiolytic and analgesia effect and amnesia, without the need for mechanical ventilation and preservation of ciliary reflex and light verbal physical stimulation. Due to the potential risk of cardiorespiratory depression caused by the combined intravenous administration of benzodiazepines and narcotics, conscious sedation should be administered in a hospital setting, with resuscitation and ventilation equipment available, in addition to cardiac monitoring throughout the procedure. [25, 26]

It is aimed at maintaining adequate sedation with minimal risks, reducing anxiety, and promoting analgesia and amnesia. It is a safe and efficient method with immediate action, rapid regaining of consciousness, and a low incidence of post-operative side effects. [25] As there is no isolated pharmacological agent or technique that satisfies these requirements, the anesthesiologist physician must combine drugs to get closer to the ideal situation.

The pharmacological agents used for conscious sedation are: propofol, midazolam, and fentanyl and ketamine in combination. [27]

Propofol is the drug of choice for inducing and maintaining anesthesia, and the most-used intravenous agent for ambulatorial anesthesia and sedation due to its pharmacodynamic properties and its favorable pharmacokinetics. It is characterized by rapid onset and short duration of action, its short half-life, high plasma clearance (equal to or higher than the blood flow of the liver) associated with the great distribution volume, and rapid regaining of consciousness even after prolonged and continuous infusion when used as the sole anesthetic agent.

Used in sub-hypnotic doses, propofol provides an easily titratable level of sedation and anxiolysis, similar to that of midazolam. When propofol is used in low concentrations, its respiratory effects are moderate and allow spontaneous ventilation during the maintenance of anesthesia and sedation.[27] It also presents a well-known antiemetic effect. Propofol does not exert an analgesic effect, making necessary the combination of analgesics, such as fentanyl. [9]

Fentanyl is a widely-used opioid for ambulatorial anesthesia. It is a potent opioid agonist derived from phenylpiperidine, and acts on analgesia and sedation. Despite its cumulative potential, when used in low doses (25-100μg) it does not delay the recovery and provides adequate immediate post-operative analgesia. It can also be used as a pain killer in the early stages of recovery, for it provides analgesia in a timing sufficient to allow the onset of the action of opioid analgesics. As with all opiates, it should be used in the titration, in view of its slow onset (four minutes to achieve the effect), with respiratory ventilation equipment available.[27]

A potent benzodiazepine, midazolam is characterized by a slower onset of action than that of diazepam, and a short half-

life of elimination (two hours). Sedative effects vary among patients, and the sedation recovery time can be prolonged, accompanied by slow recovery of higher functions, and persistent amnesia after waking. The complete recovery requires approximately 90 minutes after a single 0.1mg/kg dose. In addition to its use in conscious sedation, it is also used as a pre-anesthetic medication. Cardiovascular side effects are rare and mild in the doses used for sedation, however can be significant with higher doses, especially in hypovolemic patients.[26]

Ketamine is an intravenous dissociative anesthetic that plays an important role in analgesia and sedation in ambulatorial surgeries and procedures, especially as an adjuvant to other hypnotic drugs. The hypnotic sedative property results in light dissociative sleep with a potent analgesic property.

Its clinical effects are mediated by non-competitive antagonism in the opioid receptors. The analgesic properties in plasma concentrations are significantly lower than those of the drugs that produce unconsciousness. The adjuvant use of ketamine during propofol sedation offers significant analgesia and minimizes the need for additional opioids when administered in sub-hypnotic doses. [28]

The choice and use of these drugs for conscious sedation by the anesthesiologist physician must be individualized. The clinical follow-up carried out by the anesthesiologist during and after the procedure is of crucial importance for the patient's comfort and therapeutic success.

CONCLUSION

Phenol peeling is an important treatment in facial skin rejuvenation, in addition to being a possible therapy in malignant and pre-malignant conditions; the interaction between the dermatologist and the anesthesiologist physician for the implementation of the procedure makes it less traumatic for the patient. Further studies should be carried out with an aimat achieving a higher level of scientific evidence.●

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Questions for continuing medical education—CME

1) The action of chemical peels (controlled destruction of the skin) depends on the following factors, except for:

a) pH of the applied solution.
b) wavelength and energy used.
c) composition of the applied agent.
d) chemical agent's ability to penetrate.
e) duration of exposure.

2) The phenol or carbolic acid, when in contact with the skin:
a) penetrates up tothe reticular dermis.
b) penetrates up tothe papillary dermis.
c) causes anesthetic action due to the deep penetration (infraplexovascular).
d) coagulates the proteins of the epidermis.
e) coagulates the vascular plexus between the layers of the dermis.

3) Phenol peeling according to the Baker-Gordon formula:

a) smoothes rhytids, even the deepest.
b) causes whitening of the skin.
c) is indicated for high-grade photo ageing, according to the classification of Glogau.
d) is the most effective chemical method for facial rejuvenation.
e) all are correct.

4) In addition to the rejuvenating action of phenol peeling, it can also be used in the following situations:

a) multiple actinic keratoses of the face.
b) superficial basal cell carcinoma.
c) Bowen's disease.
d) all of the above are correct.
e) the indication of phenol peeling is purely cosmetic.

5) The effect of the Baker-Gordon peeling is directly proportional to the penetration of phenol. The below factors contribute to that penetration, except for:

a) presence of a surfactant, for instance liquid soap.
b) presence of a vesicant, for instance croton oil.
c) the purity of phenol, its absolute concentration of 88%.
d) occlusion with waterproof tape for 48 hours.
e) dilution with water.

6)Why is there a persistence of pain after the application of phenol peeling?

a) The pain ceases immediately after the completion of the application, thus there is no persistence of pain.
b) due to the necrosis of the dermis papilorreticular.
c) due to the occlusion with waterproof tape after the application.
d) due to the slow penetration of the phenol up to the nerve endings.
e) due to the croton oil.

7) Check the alternative, corresponding to what was shown in the study.

a) The level of scientific evidence in this study was the highest because it was a systematic review.
b) The existing cootes have allowed an excellent level of evidence.
c) The study was based on four databases: Cochrane, PubMed, LILACS, and Embase.
d) Dermatologists depend on the evaluation of other experts, which is considered the lowest level of evidence.
e) The primary and secondary sources existing in the literature contemplate the subject, dismissing further studies and allowing systematic reviews and meta-analysis.

8) Conscious sedation, a procedure that is increasingly used in dermatological procedures, consists of:

a) any degree of sedation with maintenance of the ciliary reflex.
b) any degree of sedation with light verbal and physical stimulation.
c) sedation with good anxiolytic and analgesic effects.
d) the presence of amnesia, without the need for mechanical ventilation.
e) all are correct.

9) Of the following drugs, which provides an analgesic effect?

a) Propofol.
b) Fentanyl.
c) Midazolam.
d) Ketamine.
e) B and D provide analgesia.

10) Choose the correct alternative.

a) Anesthesia follows a protocol that depends only on the weight of the patient.
b) According to the authors' findings, the best option is general anesthesia with mechanical ventilation.
c) Trocular anesthesia with lidocaine generates comfort in this procedure and in the hours subsequent to the application of the Gordon and Baker solution.
d) Phenol peeling does not generate significant pain to the point of requiring sedation and analgesia.
e) All are wrong.

Key:
Laser assisted tattoo removal: a literature review. 2013,5(4):289-96.

1D, 2C, 3A, 4E, 5C, 6D, 7B, 8E, 9D, 10B

Answers must be submitted online using the website www.surgicalcosmetic.org.br.
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Paramedian forehead flap for complex nasal defects following Mohs micrographic surgery

Retalho paramediano frontal na reconstrução de defeitos nasais complexos após cirurgia micrográfica de Mohs

Article
Original

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ABSTRACT

Introduction: The paramedian forehead flap has been used for centuries in nasal reconstruction. It is a unique flap in terms of restoring complex nasal defects. It can adequately restore contour, texture, projection of the nasal tip and convexity of the ala, especially when combined with cartilage grafting.
Objectives: To evaluate the versatility of the paramedian forehead flap in nasal reconstruction following Mohs micrographic surgery, especially in an outpatient setting and under local anesthesia. Furthermore, to discuss traditional approaches versus more recent refinements on its design and execution.
Methods: Retrospective study of patients with surgical defects resulting from Mohs micrographic surgery that have been repaired using the paramedian forehead flap.
Results: Nineteen patients were included in the study. Restoration or the nasal mucosa was required for full thickness defects in 4 (22%) patients. Structural support provided by auricular cartilage graft was required in 12 (67%) patients. The flap pedicle was designed ipsilaterally to the defect in 14 (74%) patients. Complications were minimal and unusual.
Conclusions: The paramedian forehead flap is a valuable technique in the repair of extensive and deep nasal defects following Mohs micrographic surgery. With proper surgical planning, adequate measures for patient comfort, and meticulous technique, the paramedian forehead flap can be safely performed in an outpatient setting, achieving unique results in nasal reconstruction.
Keywords: Mohs surgery; surgical flaps; nose neoplasms.

RESUMO

Introdução: *o retalho paramediano frontal (RPF) é utilizado há séculos em reconstrução nasal. É retalho único em termos de restauração de defeitos nasais complexos. Ele é capaz de restaurar contorno, textura, projeção da ponta nasal e convexidade da asa, principalmente quando combinado com enxerto de cartilagem.*
Objetivos: *avaliar a versatilidade do RPF na reconstrução nasal após cirurgia micrográfica de Mohs, sobretudo num ambiente ambulatorial e sob anestesia local, bem como discutir abordagens tradicionais e refinamentos recentes em seu design e execução.*
Métodos: *estudo retrospectivo de pacientes com defeitos cirúrgicos decorrentes de cirurgia de Mohs reparados com o RPF.*
Resultados: *19 pacientes foram incluídos no estudo. Restauração da mucosa nasal foi necessária para defeitos de espessura total em quatro pacientes (22%). Suporte estrutural fornecido por enxerto de cartilagem auricular foi necessário em 12 (67%) pacientes. O pedículo do retalho foi desenvolvido ipsilateral ao defeito em 14 pacientes (74%). Complicações foram mínimas e incomuns.*
Conclusões: *o RPF é retalho valioso no reparo de defeitos nasais extensos e profundos após cirurgia de Mohs. Com planejamento cirúrgico adequado, medidas para conforto do paciente e técnica meticulosa, o RPF pode ser realizado ambulatoriamente com segurança, atingindo resultados exclusivos na reconstrução nasal.*
Palavras-chave: *Cirurgia de Mohs; retalhos cirúrgicos; neoplasias nasais.*

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INTRODUCTION

The paramedian forehead flap (PFF) has been used for centuries in nasal reconstruction. It is a unique flap in terms of restoring complex nasal defects. Overtime, numerous modifications and refinements have been described to improve its outcome and versatility.[1] Adequate training, good surgical technique, and careful planning are necessary to achieve optimal results.

The PFF is classified as a staged interpolation flap for having the following features: vascular pedicle based on a named artery and/or its tributaries, donor location distant and noncontiguous from the defect, and more than one stage for completion. Its main indications are large and deep wounds located on the distal nose (tip and ala).[2] It can uniquely restore contour, texture, projection of the nasal tip and convexity of the ala, especially when combined with cartilage grafting. Due to its bulkiness, the PFF is less ideal for the upper nose (nasal sidewall, dorsum and root), which has thinner skin. Disadvantages related to the flap are the necessity for a multi-staged procedure and the forehead donor site scar, which is usually inconspicuous.

The purpose of this study is to evaluate the versatility of the PFF for nose reconstruction after Mohs micrographic surgery, especially in an outpatient setting under local anesthesia. Furthermore, the article will discuss traditional approaches versus more recent refinements on its design and execution.

METHODS

Patients

This was a retrospective study of 19 patients whose nasal defects were repaired with the PFF after Mohs micrographic surgery. Cases were identified from a private Mohs practice from 2010 to 2013. Through chart review and by analysis of photographic documentation, the following demographic and surgical data were examined: age, gender, tumor type, defect sizes and subunits involved, number of Mohs stages and repair stages, supplementary measures for patient comfort, lining restoration, cartilage grafts, pedicle design, donor site closure, postoperative complications, smoking habits, follow-up period and outcomes.

All patients signed an informed consent form prior to surgery allowing publication of photographs in scientific journals. All procedures (Mohs surgery for tumor clearance and subsequent reconstruction) occurred in an outpatient setting. Nerve blocks (supraorbital and supratrochlear) and or tumescent anesthesia supplemented local anesthesia. Prior to the procedure, patients received oral analgesics, benzodiazepines or antibiotics, if necessary. Most PFF repairs followed the Mohs surgery on the same day. Typically, the second stage took place 3 to 4 weeks after the first stage. For those that required a third stage, it was performed 3 to 4 weeks after the second.

Flap design and execution

The PFF requires a substantial knowledge of anatomy, surgical planning, and surgical skill for its correct design and execution. The primary vascular supply for the PFF is the supratrochlear artery, which is located at the medial border of the eyebrow, 1.5 to 2 cm from the facial midline. Although a Doppler may help identify the artery, this is usually not necessary as the location is highly predictable. The artery emerges from the supratrochlear foramen and below the orbital rim lies deep to periorbital muscles (orbicularis oculi and frontalis). Above the rim, the artery pierces the frontalis muscle and gradually becomes more superficial, reaching the subcutis midway up the forehead. Therefore, dissection of the pedicle should be below deep fascia near the orbital rim. Secondary vascular supply to the PFF include branches from the dorsal nasal artery.[3] Charts 1 and 2 describe a stepwise approach for the two-stage flap design and execution (Figures 1-6).

RESULTS

Nineteen patients were included in the study. Demographic and surgical data are shown in table 1. Age of the patients varied from 36 to 90 years (mean age, 67.1 years), with a predominance of men (12 men x 7 women). Basal cell carcinoma was the most common tumor (n=12), followed by squamous cell carcinoma (n=2), collision tumor (n=2) and basosquamous carcinoma (n=1). In two patients, the PFF was performed as a rescue flap to correct anatomic distortions and impaired nasal valve function from previous reconstructions. Most patients received either anxiolytics and or oral analgesics as adjuncts to local anesthesia during surgery (Table 2). Only one patient was a smoker.

The number of Mohs stages necessary to achieve clear margins varied from 1 to 5 (mean, 2.6). Defect sizes ranged from 2 cm x 1.9 cm to 4.5 cm x 4 cm (mean, 2.9 cm x 2.8 cm). Sixteen (84%) patients had defects that involved multiple subunits (Table 3). Tip (n=15) and ala (n=12) were the most frequent involved. Resection of an additional portion of a subunit was performed in 17 (90%) patients. The PFF was combined with other closures in four patients that had wounds extending beyond the nasal subunits.

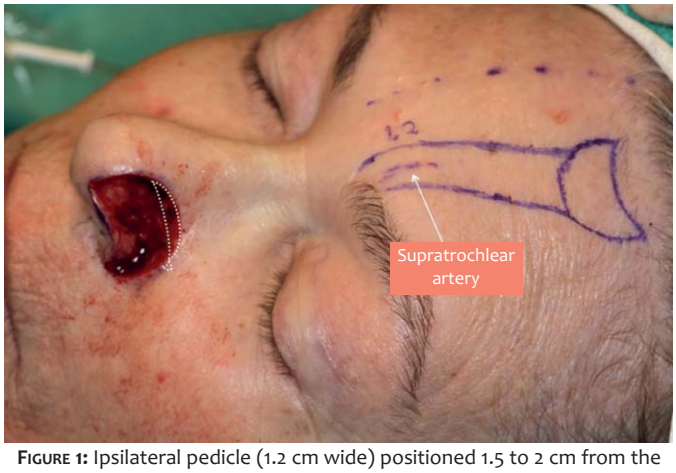

Figure 1: Ipsilateral pedicle (1.2 cm wide) positioned 1.5 to 2 cm from the midline. The left ala subunit was completely removed. The part of the defect that involved the nasal sidewall (dotted) was left to heal by second intention

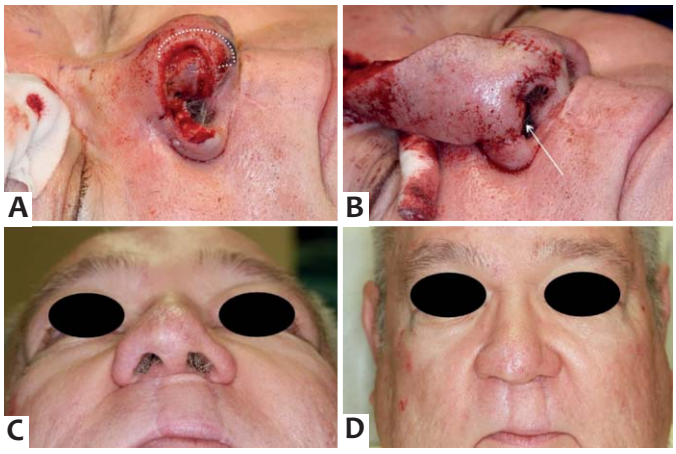

Figure 2: A) Full-thickness defect involving the nasal tip and right ala. The remaining portion of the hemitip subunit (dotted) was resected. **B)** Folded PFF (arrow) in place. **C)** 14 month follow-up. Alar contour preserved without nasal vestibule compromise. **D)** Preservation of alar creases. Upper lip scar due to prior Abbé flap

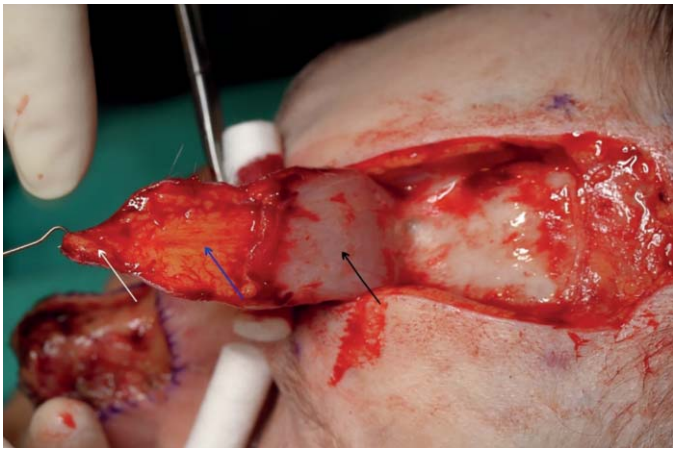

Figure 4: The flap is elevated in three different planes. Superficial subcutaneous (white arrow), deep subcutaneous (blue arrow), and subgaleal (black arrow)

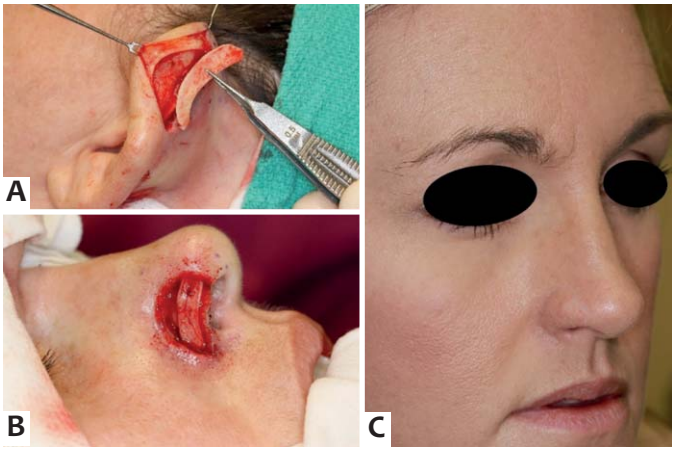

Figure 3: A) Cartilage graft harvested from the antihelix via posterior incision. **B)** Cartilage graft in place. **C)** 9 month follow-up with excellent functional and aesthetic results.

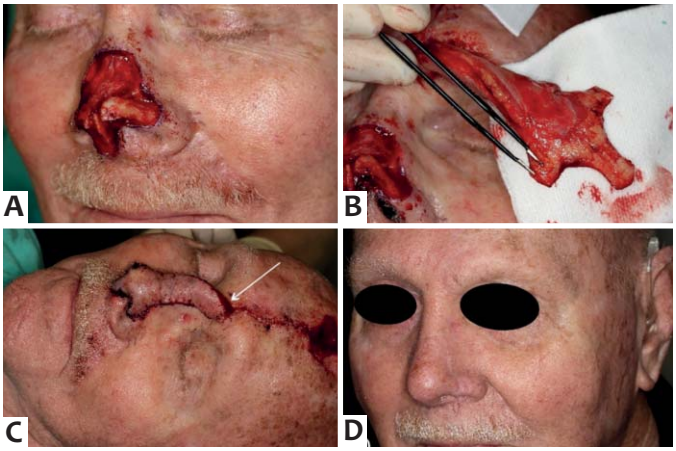

Figure 5: A) Extensive defect with cartilage grafts in place. **B)** Flap elevated in the superficial subcutaneous in its most distal portion. **C)** Bovine dermal collagen on the forehead and on the exposed pedicle (arrow). **D)** 6 month follow-up with restoration of the nasal contour

Mucosal restoration was required for full-thickness defects in 4 (22%) patients and was achieved by folded PFF (n=3) or primary closure (n=1). Structural support provided by ear cartilage was necessary in 12 (67%) patients. Cartilage was harvested from the conchal bowl (n=8) or scaphoid fossa/antihelix (n=4). A posterior incision to harvest the graft was used in 9 (75%) of the 12 patients.

The flap pedicle was designed ipsilateral to the defect in 14 (74%) patients (Figure 1) and contralateral in 2 (10%). The three remaining patients had defects centrally located. Closure of the forehead was most commonly accomplished by primary closure combined with bovine dermal collagen (n=15) or second intention healing (n=3). Only one patient had the forehead closed completely. Bovine dermal collagen was also used in 18 (95%) patients to cover the exposed surface of the pedicle (Figure 5).

Complications were minor and uncommon (Table 4). Three complications occurred following the first stage. One patient had post-operative bleeding immediately after surgery, which required additional hemostasis for control. This patient was taking two anticoagulants. Another patient developed infection on the cartilage donor site and one superficial tip flap necrosis (<5% of flap surface). The infection was treated with oral antibiotic whereas the necrosis was excised and the flap repositioned, which required an extra stage. Following the second stage, three patients had complications. Two had superficial and proximal necrosis (10 and 40% of flap surface) due to aggressive thinning. Both were treated with wound care and

Chart 1: Stage 1. Paramedian forehead flap - steps and comments

STEPS	COMMENTS
1 **Outline natural landmarks prior to anesthesia.**	Outline nasal subunits. If more than 50% are involved, consider resecting the remainder of the subunit. (Figure 1)
2 **Create a template of anticipated repair (defect +/- adjacent subunits)**	Use the suture foil as a template. The template should be based on the unaffected contralateral half, if possible. For deeper defects, cover the wound's deep portions with moist gauze and base the foil template on the more superficial dimensions (height x width, rather than height x width x depth). Create the template before excising any subunit to avoid artificially enlarged dimensions due to wound contraction. If repairing the mucosa with the flap, create separate templates: one for the mucosa portion and another for the surface portion.
3 Decide the pedicle's side (ipsilateral X contralateral).	An ipsilateral pedicle is preferable in most cases (Figure 1). Advantages: less torsion and twisting as the flap is rotated, shorter distance to defect (shorter length required), reduced postoperative visual obstruction.
4 **Transfer the template to the forehead.**	Rotate it 180°. Use suture or gauze to estimate the flap's range.
5 **Outline pedicle.**	Base it on the supratrochlear artery, located 1.5 to 2cm from the midline (Figure 1). The pedicle's width should be between 1 and 1.5cm. Wider pedicles restrict the flap's mobility compromising the blood flow during the movement of the flap. If possible, the pedicle's medial incision should run downwards to the glabella/nasal root (to recruit branches of the dorsal nasal artery). The lateral incision usually stops at the eyebrow.
6 **Anesthesia**	Local anesthesia with nerve blocks (supratrochlear and supraorbital) or tumescent anesthesia. Consider benzodiazepines and analgesics for patient comfort. Avoid anesthetizing all areas at the same time. Stage the anesthesia to maximize patient comfort. First, anesthetize the auricular cartilage donor site and then the forehead. Remove the cartilage and start to harvest the flap. Only after the flap has been partially elevated, anesthetize the nose. On the nose, consider supplementing with bupivacaine for a longer lasting action.
7 (#) - Repair of the nasal lining	Primary closure, hinge turnover flap, folded PFF (Figure 2), mucosa flaps.
8 (*) – Cartilage graft harvest	The antihelix or concha are ideal areas. Antihelix cartilage (Figure 3) is better for long, straight and flexible segments, whereas conchal cartilage is better for grafts that require more curvature, substance,and rigidity. The grafts must be longer than the horizontal extent of the defect in order to be properly fixed. If necessary, sculpt the cartilage to avoid sharp edges. Apply a temporary pressure dressing on the donor area.
9 (*) – Ear closure	The ear is a common site of hematoma after cartilage harvesting. Suture it first and place a bolster dressing before incising the forehead.
10 (*) Suture the cartilage to the nose.	Create "pockets" on each side of the defect with the scalpel blade. The cartilage will be inserted into these pockets. Figure of 8 suturing: helpful to secure one cartilage free edge to another. Horizontal mattress or interrupted sutures: they help to stabilize the graft over the underlying cartilage (e.g. graft for the nasal tip) or to stabilize the graft at alar rim (Figure 3).
11 - Incise the flap.	At the upper edge of the flap, hyperbevel the incision to create a delicate border (provides a better fit for the ala, infratip, and columella). At other borders, incise vertically.
12 – Harvest the flap.	The flap is elevated in three different planes. At the superior margin, elevate it in the superficial subcutaneous and gradually deepen into the deep subcutaneous and subgaleal plane as the dissection approaches the base of the pedicle in the eyebrow (Figure 4). At the inferior margin (at least 3cm above the orbital rim), undermining must be subgaleal to avoid transection of the supratrochlear artery.
13 - Prepare the defect.	Trim its edges, making them perpendicular, except for the infratip. The latter must have a beveled edge to provide a better fit for the hyperbeveled edge of the flap.
14 – Debulk the distal portion of the flap.	When necessary, remove the excess subcutaneous tissue from the distal portion of the flap, leaving a thin layer of subdermal fat. Evaluate the vascularization (bleeding at the flap's borders) as it gets "thinner".
15 - Suture the donor area.	The forehead is closed as much as possible, in 3 planes. Cover the remaining areas with bovine dermal collagen (Figure 5C) or leave them to heal by second intention. Subgaleal undermining provides additional laxity.
16 - Suture the flap to the nose.	Start from the tip with continuous or simple sutures. Dermal sutures are not necessary for most of it.
17 - Cover the pedicle.	The exposed surfaces of the pedicle are common sources of postoperative bleeding. If possible, cover them with bovine dermal collagen or Surgicel® to reduce this possibility (Figure 5C).
18 – Pedicle dressing	Wrap the pedicle with vaseline impregnated gauze, without excessive pressure.

Step 7: Required for full-thickness defects. * Steps 8, 9 and 10: cases that require cartilage graft.

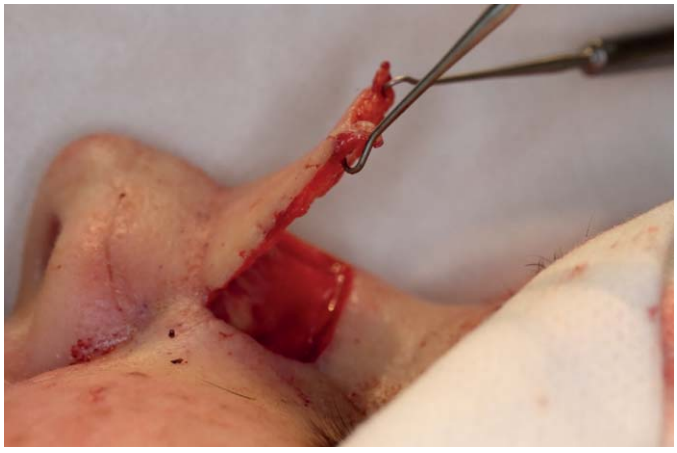

Figure 6: Flap elevated for "thinning" during the second stage. This is the appropriate thickness for this location

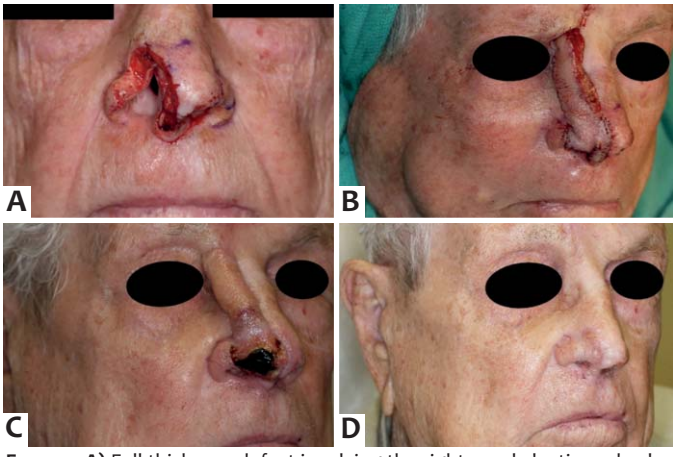

Figure 7: A) Full-thickness defect involving the right nasal ala, tip and columella. **B)** Folded PFF. **C)** Full-thickness necrosis of the distal portion of the flap. Necrotic area was later excised and flap repositioned. **D)** 3 month follow-up with good functional and aesthetic results.

healed uneventfully. One patient had full-thickness necrosis (40%) associated with infection. He was treated with oral antibiotics and excision of the necrotic area, followed by flap repositioning (Figure 7). Complication after the third stage occurred in only one patient, who developed superficial necrosis (25% of flap surface) from aggressive thinning. None of the patients who had complications were current smokers. Despite complications, all patients had excellent functional and aesthetic results. No tumor recurrences occurred after follow-up period ranging from 4 to 49 months (mean, 29 months).

DISCUSSION

The nose is one of the most common locations for skin cancer and frequently represents a challenge for reconstruction after surgical defects. Closure options are individualized for each patient and defect. For large defects on the distal nose, however, options that achieve a good functional and aesthetic outcome are limited. When wounds are extensive, deep, and or involve missing cartilage or mucosal lining, no other repair can approach the consistency and predictability of the PFF.

The subunit principle is an important concept in reconstruction[4] If a defect involves greater than 50% of a subunit, excising the residual skin and resurfacing the entire subunit may yield better aesthetic outcomes (Figure 1). Just as a damaged fender or car door is completely replaced for better contour and camouflage, the nose also benefits from subunit repair. This principle, however, is not absolute.[5] Excellent results may be achieved with partial subunit replacement. In this study, three (16%) patients had partial subunit resections (hemitip) with excellent results (Figure 2). Fourteen (74%) patients had complete subunit excision. Among those, seven (50%) also had partial excision of an additional subunit.

The PFF should be thought of as a robust surface covering that can provide soft tissue thickness but not structural support. Nasal lining and structural cartilage are the infrastructures that must be either intact, supplemented, and or restored prior to the PFF.[6] Options to restore small mucosal defects (<1cm) include a turnover hinge flap, turndown of a forehead flap extension, a full-thickness skin graft (FTSG), and bipedicle vestibular skin advancement flap. Larger lining restoration may require a turnover forehead flap, FTSG vascularized by an overlying PFF, or intranasal lining flaps (septal mucoperichondrial hinge flap, composite septal chondromucosal pivotal flap).[7,8] Intranasal mucosal flaps are difficult to perform without conscious sedation or general anesthesia. Other options above, however, may be successfully executed under local anesthesia.

Chart 2: Stage 2. Paramedian forehead flap – steps and comments

STEPS	COMMENTS
1 – Pedicle division.	Incise the pedicle in a V shape, 2 cm from its insertion on the forehead/eyebrow.
2 – Suture the pedicle's base.	The closure can be primary or using the proximal portion of the V-shaped pedicle. The repositioning of the eyebrow is crucial in all cases and may require a crescent excision above the eyebrow.
3 – Trim and thin the flap.	Elevate the proximal portion of the flap carefully, incising the suture lines of Stage 1. Outline the excess skin to be excised. Trim and thin the flap as needed (Figure 6).
4 – Suture the remaining flap.	Re-approximate the borders cautiously, in 2 planes.

When required, intermediate procedures (flap debulking and thinning, cartilage insertion), should occur prior to pedicle division.

Table 1: Demographic and surgical data

Age (years)	Gender	Tumor	Mohs stage	Defect (cm)
36 to 90	7 women 12 men	BCC (12) SCC (2) Collision (2) Basosquamous carcinoma (1) * revision (2)	1 to 5 (mean = 2.6)	2 x 1.9 to 4.5 x 4 (mean = 2.9 x 2.8)

* The PFF was performed as a rescue flap to correct anatomical distortions and nasal valve functionally compromised from previous reconstruction.

Table 2: Supplementary measures for patient comfort

	Tumescent anesthesia	Analgesics	Benzodiazepines
Number of patients	6 (32%)	7 (37%)	11 (58%)

* Some patients received combined measures

Table 3: Number of involved subunits

Subunits	Patients (N=19)
1	3
2	4
3	3
>3	9

Cartilage grafts are either structural (native cartilage present but additional needed for support) or restorative (replacing what was removed). Structural functions of cartilage include: 1) preventing tissue contraction and distortion, 2) bracing heavy flap tissue, 3) maintaining airway patency and augmenting the internal nasal valve, and 4) achieving contour support (i.e. nasal tip graft for better projection).[2] Donor sites for cartilage grafts may include the antihelix (scaphoid fossa) and the conchal bowl from one or both ears.[9,10] Other cartilage sources, such as a cadaveric or patient's rib and nasal septum are beyond the scope of this article.

Incisions for harvesting cartilage may be either anterior or posterior. Anterior incisions are easier for access, but scars are more noticeable. Antihelical cartilage is ideal for long, straight and flexible segments, whereas conchal cartilage is ideal for grafts that demand more curvature, substance, and rigidity. Conchal grafts work better to avoid nasal valve or lobule collapse, and for collumela and tip projection. Antihelical cartilage is better suited to avoid alar rim contraction (Figure 3).[9,10] Sculpting and beveling of the graft is often necessary to achieve the desired thickness, contour, shape, and tapered edges. This should be carefully done since cartilage is a fragile structure and may break during the process. Traditionally, a number 15 blade is used for sculpting. However, a schick blade allows a more delicate sculpting and graft contour if properly used. Cartilage grafts may be safely harvested under local anesthesia.[11] Only one patient developed a postoperative infection, which resolved after oral antibiotics. Postoperative pain after PFF is variable. However, if cartilage grafting was performed then the auricular donor site is predictably more painful after surgery than the forehead flap donor site. Injecting long acting local anesthetic (Bupivacaine) after closing the ear donor site and postoperative analgesics (anti-inflammatory/narcotic combination) is advised for patient comfort.

Whether the PFF should be completed in two or three stages is a matter of debate. Folded PFFs that restore nasal lining absolutely require three stages (Figure 2). The first stage harvests

Table 4: Complications and management

Complications	1st Stage	2nd Stage	3rd Stage	Management
Bleeding	*1 (flap)			Additional hemostasis.
Infection (site)	1 (concha)	**1 (flap's tip)		Oral antibiotics; wound care.
Superficial necrosis (#)	1 (5%)	2 (10% and 50%)	1 (25%)	Wound care. For the case of the 1st stage, the necrosis area was excised and the flap repositioned.
Full-thickness necrosis (#)		**1 (40%)		The necrosis area was excised and the flap repositioned.

Flap's surface in percentage terms. * The patient was using two anticoagulants. ** Same patient.

the flap and folds it to provide both nasal lining and surface covering. The second stage (3 weeks) retains the pedicle, but opens the PFF margin at the alar rim to debulk excess tissue and to insert cartilage support. The third stage (6 weeks) divides the pedicle and sculpts the flap further for completion. PFFs that are not folded to restore lining may also be staged in 3 sessions.[12] The first stage incorporates cartilage support and PFF creation and inset. The second stage (3 weeks) elevates the flap partially and debulks excess tissue to improve contour. The third stage (6 weeks) then divides the pedicle. The main advantage of the three-stage PFF is the ability to sculpt a thin, supple contour in patients with delicate nose tips and ala. Two stage flaps in these patients often result in bulbous, thick contours. Disadvantages of the three-stage PFF are the delay in pedicle division and the extra procedure. However, the three-stage procedure is more reliable in smokers as the flap contains muscle and has a very robust blood supply. It may also be of benefit in cases where a profound underlying lining and cartilaginous reconstruction have been performed, as the frontalis provide an extremely rich anastomotic vascular network.[13] Six patients (31%) required a three-stage PFF in this study. Three were submitted to folded PFFs, two required a more aggressive thinning, and one needed repositioning of the flap due to distal necrosis.

For most patients, the two-stage approach is safely performed by debulking the distal portion of the flap at the first stage. As long as a thin layer of subdermal fat is preserved, then the supratrochlear artery is protected.[13] Thinning of the proximal portion of the flap is usually performed at the time of pedicle division and should be carefully done (Figure 6). If elevation and thinning are too aggressive, necrosis may result.

Pedicle side is an important consideration when designing the PFF. Traditionally, the pedicle has been designed contralateral to the defect to minimize its torsion. However, a narrow pedicle (1 to 1.5 cm) allows an ipsilateral design without concerns about significant torsion.[14] Moreover, the ipsilateral design increases the flap reach. Further modifications that increase flap length include extending the incisions of the pedicle below the orbital rim,[4,6,15] and extension of the flap into the anterior frontal scalp or in an oblique fashion.[16] The oblique design, however, may affect the eyebrow position after donor site closure or contraction caused by second intention healing. The presence of scars within the donor site of the forehead should be assessed since it may affect the flap vascular supply.[17]

Attempting to completely close the forehead donor site is not advisable. The forehead is approximated as much as possible without tension. However, when significant tension is noted, the remaining wound should heal by second intention.[2] Heroic measures such as bilateral forehead rotations or skin grafting only increases morbidity and pain without significant benefits. To facilitate second intention healing without the morbidity of additional procedures, bovine dermal collagen was used in 15 (79%) of our patients, an approach that has not been reported in other studies with PFF. We do not recommend the use of FTSG or STSG for the remaining donor site closure since it can result in a large "patchy scar". Recently described for the PFF, however, is a delayed FTSG harvested from the pedicle on the stage II.[18]

Traditionally, the non-epidermal portion of the pedicle is left exposed. However, postoperative oozing is common as epinephrine from the local anesthetic wears off. Options that reduce bleeding from the pedicle include application of a hemostatic agent (Surgicel®),[19] skin grafts[12] or bovine dermal collagen. The disadvantage of a skin graft is the extra procedure required. Regardless of the method chosen, adequate hemostasis of the pedicle is a critical step.

Defects that extend beyond the nasal subunit are best closed separately (Figure 1). For instance, cheek defects are typically reconstructed with primary closure or cheek advancement flap. The leading border of the cheek flap may be secured to the periosteum of the maxilla to prevent the flap from migrating laterally during the healing process.

Potential complications of the PFF include bleeding, pain, poor scarring, infection, dehiscence, distortion of free margins and flap necrosis.[20] In a recent study by Cook,[21] the rate of complications associated with dermatologic surgeons performing PFF in an outpatient setting under local anesthesia was equal to or lower than published complication rates from other surgical specialties. In this study, despite the higher rate of complications compared to previous studies performed by dermatologic surgeons, complications were minor and treatable. Furthermore, all patients had optimal to excellent functional and aesthetic results.

CONCLUSION

The PFF is a valuable flap in the repair of large and deep nasal defects following Mohs micrographic surgery. Its reliable blood supply, color, and textural qualities and resultant contour warrant strong consideration for its application. Restoring the entire subunit should be considered. Optimal results, however, may be achieved with hemi subunit repair. With good surgical planning, measures for patient comfort, and meticulous technique, the PFF may be safely performed in an outpatient setting and can achieve unique restoration of the nose. •

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Article
Original

Intense Pulsed Light in the treatment of scars caused by burns

Luz Intensa Pulsada no tratamento de cicatrizes após queimaduras

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ABSTRACT

Introduction: Scars caused by burns have the potential to cause clinical, social, and functional disruptions. Dermatologists should be able to intervene in this process by combining technological advances with traditional techniques.

Objective: To evaluate the effect of Intense Pulsed Light applications on scars after burns, based on clinical parameters described in the international Vancouver Scar Scale.

Methods: A prospective study was carried out with six patients who underwent five monthly Intense Pulsed Light sessions over the entire area of a wound. The analysis of the results was conducted by three evaluation groups: 3 physician researchers, the patients included in the study, and 3 physician observers. The evaluation was implemented using the Vancouver Scale, a questionnaire based on this scale, and additionally a general rating used by all evaluators based on a numerical scale. The data obtained by examining the differences before and after the treatment, was analyzed through the Wilcoxon signed-rank test.

Results: A statistically significant decrease was observed in the analyses of all clinical parameters of the scars, when evaluated before and after the completion of the treatment.

Conclusions: The present pilot study demonstrates the advantages of Intense Pulsed Light as an approach to this specific type of scar, with an aim of stimulating further studies in order to improve this low-cost technology, as compared to lasers.

Keywords: lasers; intense pulsed light therapy; cicatrix; burns.

RESUMO

Introdução: *Cicatrizes após queimaduras têm potencial de causar transtorno clínico, social e funcional. O dermatologista deve estar apto a intervir nesse processo aliando o avanço tecnológico às técnicas tradicionais.*

Objetivo: *avaliar a resposta da Luz Intensa Pulsada (LIP) em cicatrizes após queimaduras baseada em parâmetros clínicos descritos na escala internacional de Vancouver para cicatrizes.*

Métodos: *estudo prospectivo com seis pacientes que foram submetidos a cinco sessões mensais de LIP (Luz Intensa Pulsada) sobre toda área de cicatriz. A análise dos resultados foi obtida a partir de três grupos de avaliação compostos por: três médicos pesquisadores, os pacientes incluídos no estudo e três médicos observadores através da escala de Vancouver e de um questionário nela baseado, além de uma nota geral em escala numérica respondida por todos os avaliadores. A variação de antes para depois do tratamento dos dados obtidos foi analisada pelo teste dos postos sinalizados de Wilcoxon.*

Resultados: *observou-se queda estatística significativa nas análises de todos os parâmetros clínicos avaliados das cicatrizes antes e após término do tratamento.*

Conclusões: *nosso trabalho representa um estudo piloto que demonstra as vantagens da LIP na abordagem deste tipo de cicatriz e que visa estimular estudos complementares para aprimoramento dessa tecnologia de baixo custo se comparada aos lasers.*

Palavras-chave: *lasers; terapia de luz pulsada intensa; cicatriz; queimaduras.*

INTRODUCTION

Scars resulting from burns have the potential to cause significant disruption tobearers due to their often disfiguring clinical appearance, to the entailed functional impairment, and to the social embarrassment they produce.The approach to treatingscars includes several therapeutic options, such as pressure therapy, intralesional corticosteroid therapy, cryotherapy, silicones, topical treatments, and surgical corrections. These techniques—combined or not—neverthelesshave limited results, especially regarding the clinical appearance of scars.

Laser therapy has emerged as a therapeutic option for approaching scars. Published studies fromthe 1970s have highlighted that analysis of characteristics of the scar area, such as texture, thickness and color, constituted decisive parameters in pre-laser treatment evaluation.The improvement of this technique occurred *pari passuto* thedevelopmentof the treatment of atrophic scars usingablative (CO_2 and Erbium:YAG) and non-ablative (1,320nm Nd:YAG)lasers and, more recently, fractional lasers. In the literature, the use of laser therapy for hypertrophic scars is conflicting and despite the gradual replacement of the Argon, 1,064nm Nd:YAG and 10,640nm CO_2 lasersfor the 585nm and 595nm Pulsed Dye Laser (PDL) with promising results, further studies with a greater degree of evidence are still necessary. [1-10]

In the present study, intense pulsed light (IPL) is used as a therapeutic option in the approachto scars caused by burns. Although there are publications suggesting the use of IPL as a therapeutic option in the approach of hypertrophic and keloid scars, its use for the treatment of scars after burns still remains unexplored and discussions about its indication for this purpose remain scarce. [1, 2, 4]

OBJECTIVE

To evaluate the response of IPL on scars after burns, based on the clinical parameters described in the international Vancouver scale used to assess scars. [11, 12]

METHODS

A prospective study was conducted from March 2012 to March 2013, at the Cosmetic Dermatology ambulatory of the Instituto de Dermatologia Prof. Rubem David Azulay, Santa Casa de Misericordia do Rio de Janeiro, with the approval of the Medical Ethics Committee of the institution. Six patients of both genders (4 women and 1 man), with ages between 21 and 48 years (mean = 33 years), with varied distribution of phototypes according to the Fitzpatrick classification (Table 1), who showed scarring from thermal burns which had occurred more than six months before and who had undergone prior conventional treatment in centers for treatment of burns, and who were not under ongoing topical treatment at the time of the study, were included in the present research.

The exclusion criteria in the selection of patients included: contraindications to the use of IPL, pregnancy or lactation, presence of symptoms of pain, burning and/or itching in the scar area, use of oral retinoids in the previous six months, and use of medication that induced photosensitivity in the previous three months.

After the evaluation of the above criteria, all patients were informed of the study's objectives and were enrolled in the project according to their interest in participating. All participants read and signed a free and informed term of consent. Photographic records were always carried out in the same room and with the same photographic background, preferably by the same researcher physician, with a Nikon Cool Pix P100 (26x Zoom) camera, before and after the treatment. (Figures 1 to 7)

Patients underwent five IPL sessions at monthly intervals over the entire area of the scar using a Lip Sq tip (Square-wave Pulse system), which features an integrated cooling system through a sapphire tip, with 540nm cutoff filter from the Etherea® platform (Industra Technologies, São Carlos, SP, Brazil).

Before each session, the target area was cleansed with a lotion with no alcohol and without the prior use of a topical

Table 1: Patients' age, gender, and phototype. Fluence and average pulse duration/session. Scar'ssite

PATIENT	AGE (years)	GENDER	PHOTOTYPE	FLUENCE (J/cm2)	PULSE DURATION (ms)	SITE
A	21	female	IV	12~15	12	Perioral
B	28	female	II	12~13	20	Upper limbs
C	32	female	II	16~18	10~20	Dorsum and upper limbs
D	36	male	IV	12~13	20	Upper limbs
E	48	female	II	14~16	10~20	Breast
F	28	female	II	12~13	20	Breast

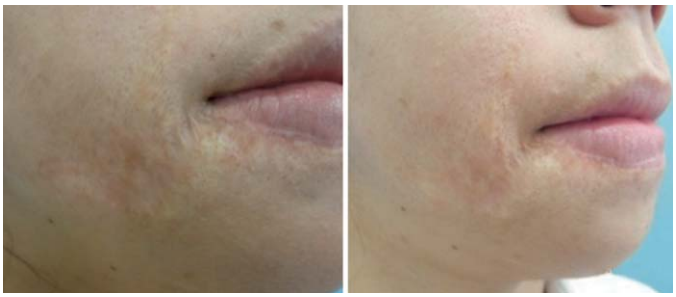


Figure 1: Patient A–pre- and post

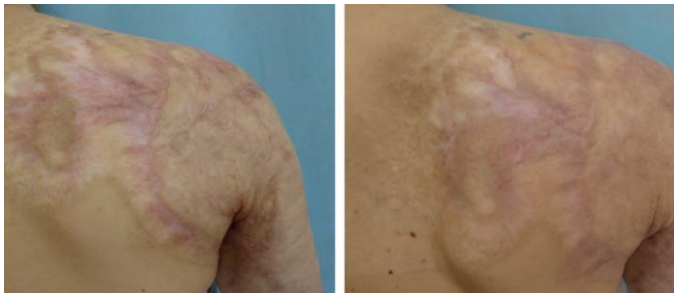


Figure 4: Patient D –pre- and post

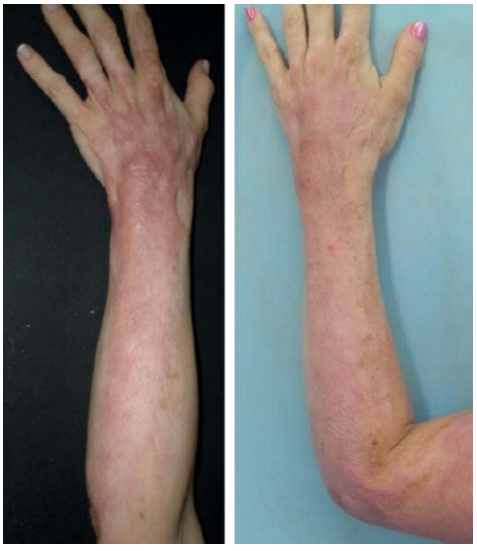


Figure 2: Patient B - left upper Limb, pre- and post

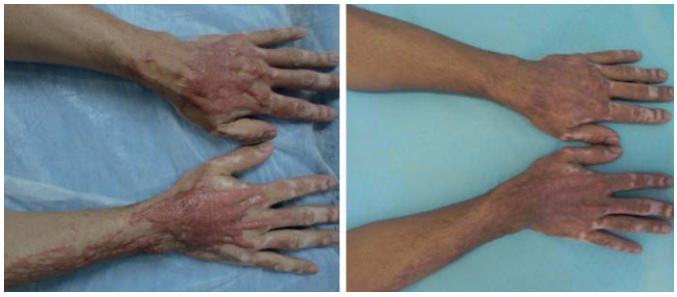


Figure 5: Patient E –pre- and post

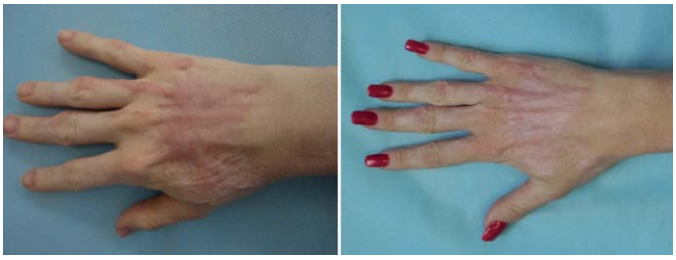


Figure 3: Patient C –pre- and post

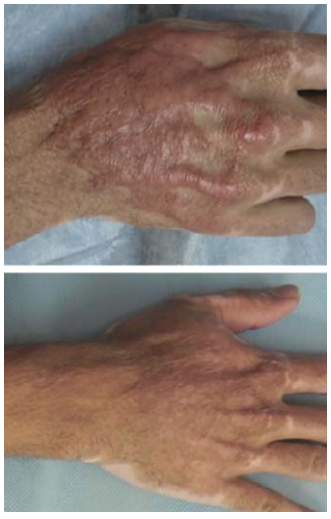


Figure 6: Patient D - detail of the right hand dorsum, pre- and post

anesthetic. The parameters used in each session were defined according to the patient's tolerance regarding discomfort, with the data being recalculated according to the clinical results obtained in previous sessions. The fluence used was 12-18 J/cm^2 (mean =14.6 J/cm^2) and the pulse duration was 10 or 20 ms. (Table 1). The results were analyzed by three groups of evaluators: three researcher physicians, the patients included in the study, and three observer physicians. The first two groups carried out evaluations before and three months after the end of the study, while the third group carried out its assessment based on photographic material taken before and after treatment.

The clinical course of the scars was assessed by a group of evaluators through the international Vancouver scale for scars, which includes flexibility, vascularization (degree of erythema), relief and color (melanin pigmentation). (Table 2) In order to facilitate the patients' self-assessment, five questions were formulated with possible answers based on numerical scales derived from the clinical criteria or the Vancouver scale. Also, an overal lrating, ranging from 0 (excellent) to 10 (very bad), was used by the three evaluation groups to grade the overall assessment of the scar.

The descriptive analysis presented the observed data

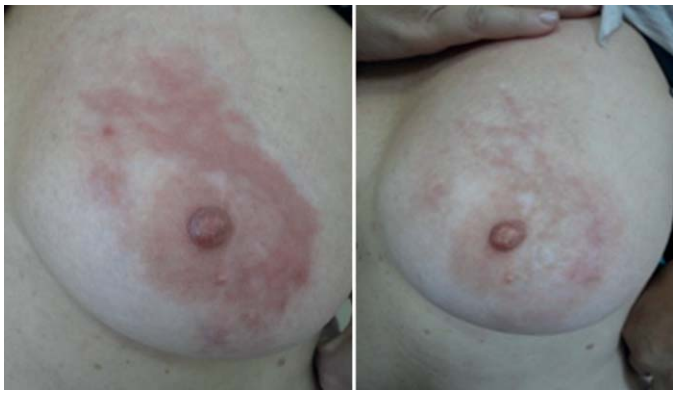


Figure 7: Before and after IPL

(expressed as median, minimum, and maximum) in the form of tables.

The before-and-after variation—assessed through a questionnaire, the Vancouver scale, and a numerical scale—was analyzed through of the Wilcoxon signed-rank test. The criterion determining the significance was set at 5%, i.e. when the p-value was less than or equal to 0.05, there would be no statistical significance.

The statistical analysis was performed with assistance of the SAS 6.11 software (SAS Institute, Inc., Cary, North Carolina, USA).

All patients selected completed the study, having answered the questionnaire before and after the treatment with an aim at verifying whether there was significant variation in the criteria assessed by the questionnaire (based on the Vancouver scale for scars). Similarly, the study aimed at validating the presence of a significant variation in the data obtained on that scale (according to the researcher physicians) and on the numerical scale (according to the patients, researcher physicians, and observer physicians).

Table 2: **International Vancouver Scar Scale**

Relief (height)	0	Normal
	1	<2mm
	2	2-5mm
	3	>5mm
Vascularization	0	Normal
	1	Pink
	2	Red
	3	Purple
Pigmentation	0	Normal
	1	Hypopigmented
	2	Mixed
	3	Hyperpigmented
Plicability	0	Normal
	1	Supple
	2	Yielding
	3	Firm
	4	Banding
	5	Contracture

The variables assessed by the Vancouver scale were originally measured in an ordinal scale, i.e.a gradation with qualitative interpretation. However, the reduced sample size (n = 6), prevented the processing of appropriate statistical methods. Therefore, the present study proposedan exploratory analysis of the data froma numerical point of view, aiming mainly at the impact of the treatment after five monthly IPL sessions. Table 3 provides the median (minimum-maximum) rating of the Vancouver scale according to three researcher physicians (RP1, RP2, and RP3) at timesbefore and after the treatment and the corresponding descriptive level (p-value) of the statistical test.

Statistical analysis was performed through the Wilcoxon signed-rank test.

The patient self-evaluation before and after the treatment showed a significant decrease (at the 5% level) in the evaluation of all aspects of the questionnaire. That statistical validation translates the clinical improvement seen in all parameters observed by the patients after the treatment, such as dyschromias, hypertrophy, and flexibility of the scarred area, using criteria based on the Vancouver scale.

According to the researcher physicians, the ratings of the Vancouver scale for scarsshowed significant decrease (at the 5% level) before and after the treatment, except for the variable pigmentation, which had initially showed little expression, as shown in table 3 and graph 1.

The assessment done according to the numerical scale and corresponding to the overall rating attributed to the three evaluation groups before and after the treatment, presented a significant reduction (at the level of 5%) for all evaluators.

Regarding adverse effects, all patients had erythema and slight, tolerable discomfort during the sessions, with no need for any specific treatment. Burning sensation for a few hours after the session was reported by two patients, however without leading to changes in the schedule of the treatment. One patient had blisters after the 4th session, resolving without sequelae.

DISCUSSION

The introduction of laser therapy has emerged as a new tool in the therapeutic approach to scars. Based on the principle of selective photothermolysis, which acts on specific chromophores, it enabled a more specific approach to the assessment of parameters prevailing in each lesion, such asvariation in color, plicability and relief. [1-4, 6, 8, 13-6]

The broad spectrum of the IPL's light beam (from 515nm to 1,200nm) allows exertion on the different chromophores present in scars—such as the hemoglobin present in the neovascularization of the intense cicatricial tissue and the melanin resulting from the stimulus of melanogenesis—enabling thetreatment of the erythema and the dyschromia, respectively. Another effect of IPL described in studies on its use in photorejuvenation is the possible induction of collagen remodeling through the photo-stimulation of the fibroblasts and metallo-

Table 3: Vancouver Scar Scale evaluation according to researcher physicians (RP), before and after the treatment

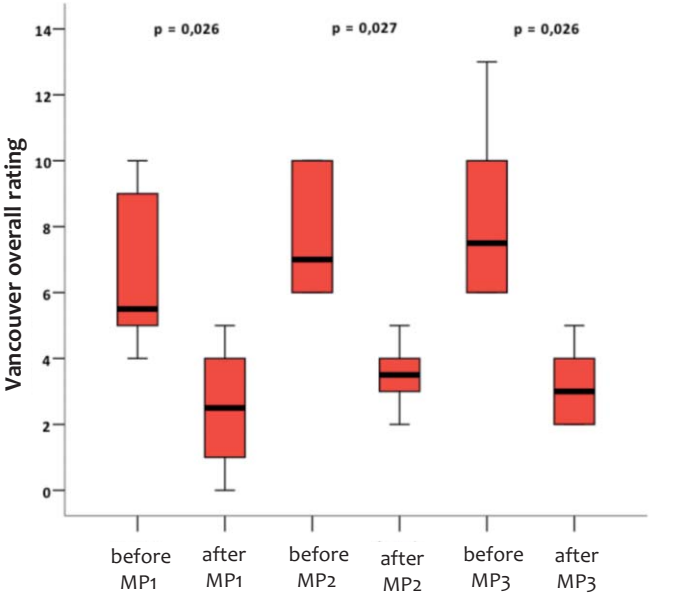
Vancouver Scale	Before				After				p-value*
	Med	Min		Max	Med	Min		Max	
Pliability – RP1	2	1	-	3	0,5	0	-	1	0,023
Pliability – RP2	3	2	-	4	1	0	-	1	0,026
Pliability – RP3	3	2	-	5	1	0	-	1	0,027
Relief – RP1	1,5	1	-	3	0,5	0	-	1	0,020
Relief – RP2	2	1	-	2	1	1	-	1	0,025
Relief – RP3	2	1	-	3	1	0	-	1	0,023
Vascularization – RP1	2	0	-	3	1	0	-	2	0,034
Vascularization – RP2	2	1	-	3	1	1	-	1	0,034
Vascularization – RP3	2	1	-	3	1	0	-	1	0,020
Pigmentation – RP1	0	0	-	3	0	0	-	2	0,32
Pigmentation - MP2	1	0	-	2	0,5	0	-	2	0,32
Pigmentation - MP3	1	0	-	3	0,5	0	-	2	0,16
Overall rating - MP1	5,5	4	-	10	2,5	0	-	5	0,026
Overall rating - MP2	7	6	-	10	3,5	2	-	5	0,027
Overall rating - MP3	7,5	6	-	13	3	2	-	5	0,027

med: median; min: minimum value observed; max: maximum value observed
* Wilcoxonsigned-rank test

proteinases of the dermal matrix. [17-24]

In the literature, there are few studies aimed at evaluating the use of IPL on scars, more specifically after burns. Its use for hypertrophic or keloid scars, isolatedly or comparatively to laser therapy, was described by Bellew et al., who approached hypertrophic scars with PDL and IPL, finding improvements in the appearance of scars with both techniques, without demonstrating superiority of one over the other. In 2008, Erol et al. treated 109 patients with IPL—the scars had different etiologies, with 19 patients suffering from thermal injury. The results presented demonstrated improvement of those scars regarding dyschromia, relief, pliability and texture of the scar tissue, through clinical and photographic parameters. More recently, Isaac et al., aiming at determining safety standards and evaluating the degree of satisfaction and local complications after each session, demonstrated the use of IPL in hyperchromic scars after burns that had occurred more than two years before in 19 patients between 9 and 62 years of age, with IPL phototypes II-V. After 9 monthly sessions it was statistically demonstrated that there was an improvement in the level of patients' and observer physicians' satisfaction, in addition to the existence of a direct correlation between the degree of improvement and the number of sessions undergone.

Although recent studies have demonstrated benefits in the use of laser therapy in the early treatment of scars caused by elective procedures, the ideal time to start the therapeutic procedures remains unclear. Bellew et al. demonstrated clinical improvement of post-mammoplasty and abdominoplasty early



Graph 1: Researcher physicians (RP) overall-rating according to the Vancouver Scar Scale, before and after the treatment

hypertrophic scars using PDL and IPL in the proliferative phase of formation of the scar tissue (6-8 weeks after the injury was caused). [25, 26]

The use of IPL during the study proved to provide clinical improvement in all parameters evaluated, such as dyschromias, pliability, and reduction of hypertrophic areas. The impro-

vement of hypertrophic scarring in all cases treated is noteworthy. Regarding dyschromias, the response was more significant in erythemas as compared to the brown color of scars. Despite the fact that hypochromic areas were not included in the rating scales of scars, no improvement was observed in this parameter. It was possible to gradually increase the intensity of treatment parameters, such as fluence and pulse duration—and to beinitially more conservative when compared to those used for photorejuvenation—without adding significant side effects.

In the present study, the authors chose to focus on the approach to scarring caused by burns that had happened over six months before. Howeverit is also possible to compare the use of IPL in earlier stages of scar proliferation in further studies. Its use in the initial phase would be an attempt to reduce the formation of hypertrophic scars, which translates clinically into relief alterations (dystrophic) caused by the imbalance in the synthesis and degradation of collagen present in the wound healing process.

CONCLUSION

In the authors' opinion, IPL is able to combine important characteristics, which suggests that this technique can be made available for patients with scars caused by burns. IPL technology is a technology familiar todermatologists, it is cost-effective when compared to other laser sources, and has been demonstrated to provide satisfactory clinical improvement—evaluated both objectively and subjectively—for the treated scars that were caused by burns. In this context, the present study represents a pilot study carried out in the authors' dermatologic service aimed at demonstrating both the benefits of IPL in treating this type of scar and stimulating further studies with more accurate assessment methods in order to create a protocol for the approach of patients affected by burns or bearing scars. ●

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Article
Original

Multicenter clinical study to evaluate safety and clinical efficacy of a body moisturizer based on ceramides, omegas, glycerin, Imperata cylindrica, erythritol, and homarine.

Estudo clínico multicêntrico para avaliação de segurança e eficácia clínica de um hidratante corporal à base de ceramidas, ômegas, glicerina, Imperata cilíndrica, erythritol e homarine

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ABSTRACT

Introduction: The skin is the largest organ of the human body and constitutes a covering layer that has many essential functions such as defense, sensorial, thermoregulatory, and aesthetic. Therefore, maintaining its integrity is extremely important for the homeostasis of the organism.

Objective: To evaluate the efficacy and safety of a cutaneous moisturizer that, in addition to traditional substances, contains in its composition other ingredients capable of stimulating the function of the aquaporins.

Methods: One hundred volunteers were clinically evaluated through medical examination and subjective self-evaluation, regarding the efficacy and safety of the product. Of these, 30 also underwent instrumental analysis through corneometry (assessment of the skin's hydration), pH metry (measurement of the skin's pH) and TEWLmetry (assessment of TransEpidermal Water Loss).

Results: During a 90-day study, all efficacy variables subjectively analyzed showed clinical improvement (dryness, hydration, softness, desquamation, and itching). In the analysis of objective variables, it was observed that the corneometry measurements showed a significant increase in skin hydration.

Conclusion: With the present study's clinical outcomes, the test product was proven effective for having significantly increased skin hydration (according to corneometry) and extremely efficient for its action on the signs and symptoms of skin xerosis (according to theassessment of the physiciansand volunteers).

Keywords: hydration, desiccation, aquaporins.

RESUMO

Introdução: *Maior órgão do corpo humano, a pele constitui revestimento com funções essenciais como de defesa, sensorial, termorreguladora e estética. Manter sua integridade, portanto, tem extrema importância para a homeostase do organismo.*

Objetivo: *Avaliar eficácia e segurança de um hidratante cutâneo que contém em sua composição, além das substâncias tradicionais importantes para a hidratação da pele, outras capazes de estimular o funcionamento das aquaporinas.*

Métodos: *Os 100 voluntários foram avaliados do ponto de vista clínico por análise médica, e também subjetiva do próprio investigado, no tocante à eficácia e segurança do uso do produto. Desses voluntários, 30 foram também submetidos a análises instrumentais de corneometria (avaliação da hidratação da pele), pHmetria (avaliação do pH da pele) e TEWLmetria (avaliação da perda de água transepidérmica).*

Resultados: *Durante os 90 dias de estudo, todas as variáveis de eficácia subjetivas analisadas apresentaram melhora clínica (ressecamento, hidratação, maciez, descamação e coceira). Na análise das variáveis objetivas observou-se que a corneometria apresentou aumento significativo na hidratação da pele.*

Conclusão: *Após os resultados clínicos do presente estudo, comprovou-se que o produto testado foi eficaz em aumentar de maneira significativa a hidratação da pele (de acordo com a corneometria) e extremamente eficiente nos sinais e sintomas da xerose cutânea, segundo avaliação médica e dos voluntários.*

Palavras-chave: *fluidoterapia, dessecação, aquaporinas.*

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INTRODUCTION

The skin playsimportant roles, the complexity and soundness of which contribute to the maintenance of the body's homeostasis. Nevertheless, these properties only function at the highest level if the skin is in full, normal operating condition and receiving adequate care.[1]

Two basic processes act in concert when this care occurs: cutaneous cleaning and moisturizing. Cleaning contributes to the removal of the external debris, natural cutaneous secretions, and microorganisms. Cutaneous hydration, in turn, is responsible for maintaining the water content in the epidermis, keeping the skin barrier in good condition. [2, 3]

The epidermal barrier is composed of the cellular protein matrix (a weft of interwoven keratinocytes arranged in layers, limited superficially by corneocytes) and the intercellular matrix (lipid bilayer), which are responsible for maintaining the normal water balance of the skin, while respecting its sectoral characteristics (the superficial epidermal cell layers repel water, while the deeper layers retain it), which are essential for the cutaneous balance.[4]

In addition to these structures, however, chemical particles (NMF - natural moisturizing factor, intercellular lipids, ion pumps and aquaporins) embedded in these two compartments are equally important and help to keep the cutaneous hydration balanced.[5]

The NMF is a keratinocytic component, being formed by a set of hygroscopic structures that interact to retain water in the integument.[1, 4, 6]

The intercellular lipids (originated from the nucleated keratinocytes and arranged in the stratum corneum) are bipolar structures, which control intercellular permeability and water movement. Such fatty structures seal the NMFs in the corneocytes, keeping the intercellular water content.[4]

The ion pumps establish the basic electrolyte balance. The ions play an active role in maintaining the water content of the intra-and extracellular medium. This fact is due to the existence of differences in their concentrations in these two media. Such differences are maintained thanks to the diffusion of these molecules facilitated through ionic channels present in all human cells. The Na+K+ pump is the best known of these channels, which along with the K + pump, helps to maintain the intracellular and extracellular concentrations of these ions.[1, 6]

Finally, the aquaporins are transmembrane proteins initially described in erythrocytes in 1991, and which currently include 13 types. In the human epithelium, aquaporin-3 (AQP3) stands out for being permeable to water and molecules such as glycerol and urea, important skin moisturizing agents, called aquaglyceroporin. It is present in the intestinal, respiratory, cutaneous, kidney, erythrocyte and chondrocyte cells. In the skin, it is located in the keratinocytes of the epidermis and represents a permeability channel, controlling the hydration.[1, 7-9]

The deletion of the AQP3 gene in mice resulted in decreased water in the stratum corneum, impairing cutaneous elasticity, and complicating the healing of wounds. This suggests a possible regulation of the differentiation and proliferation of keratinocytes by this protein. The AQP3 is also expressed in human skin fibroblasts, and epidermal growth factors increase their expression and cell migration. As a result, it seems to be a factor in the migration of fibroblasts that are involved in the wound repair process. [1, 10]

In the case of disorder in one of these barrier components, there is an increase in transepidermal water loss (TEWL), causing cutaneous xerosis, with its classic signs and symptoms.[1, 4-6]

The frequent use of moisturizers is still the treatment of choice for this condition; the primary goal of the treatment is to relieve cutaneous xerosis and irritation, preventing the recurrence of such pictures. The formulation of the mosturizing product nevertheless must be carefully observed, since its effectiveness is directly related to it. [11-13]

Moisturizers are classified according to the way their active ingredients work; these categories are: occlusive, humectants, emollients, and protein repairers.

Most often, commercial products use raw materials of each of these classes in their formulations to increase effectiveness and therapeutic success. [6, 14, 15]

Occlusive moisturizers delay evaporation and epidermal water loss by forming a hydrophobic film on the skin's surface and in the interstitium between the surface's keratinocytes. Humectant moisturizers retain water in the stratum corneum, either by pulling it from the dermis or pulling it from the environment (in conditions where the atmospheric humidity is greater than 70%). Emollient moisturizers are rich in substances capable of filling the intercorneocytic clefts,thus retaining water in that layer. [6]

The protein repairing moisturizers help to repair damaged dermal protein structures or stimulate their production. They act as moisturizers, for they assume an osmotic role, soaking up water and retaining it in the epidermis and dermis. [1, 6]

Finally, recent studies with substances capable of stimulating the expression of aquaporins have also shown considerably promising results regarding epidermal hydration, aggregating clinical benefits in the approach of cutaneous xerosis. [1, 7, 9]

The product investigated in the present study contains raw materials of all moisturizing classes in its formula (occlusive, humectant, and emollients agents), including ceramides, omega 3, 5, 6, and 7, glycerine, *Imperata cylindrica*, and erythritol and homarine, all responsible for stimulating aquaporin channels, and generating a flow of water to the site with the greatest hydration need.

OBJECTIVES

The present study was aimed at evaluatingthe efficacy and safety of using a moisturizing cosmetic product in patients bearing cutaneous xerosis, based on the clinical evaluation of the investigator physician and on the subjective evaluation of the volunteer, in addition to a research (through specific scores) and corneometry, pH and TEWL measurements.

METHODS

A clinical, multicenter, phase IV, non-placebo controlled, prospective study was carried out with 100 volunteers, who evaluated the efficacy and safety of using the product both from the clinical perspective (through medical analysis) and the subjective standpoint (through the analyses of the volunteers themselves). From the 100 selected volunteers, 30 also underwent additional instrumental analyses: corneometry (assessment of skin hydration), pH metry (assessment of skin's pH) and TEWL-metry (assessment of the transepidermal water loss).

The inclusion criteria were: volunteers of both genders, 18 to 70 years old, with cases of simple xerosis, ichthyosis vulgaris, senile xerosis, and xerosis caused by endocrinopathies. The following variables were also used as inclusion criteria: phototype I to IV (Fitzpatrick classification); contraceptive use in patients of child bearing age; capacity to adhere to the study's protocol and follow-up; absence of a history of allergic reactions to the product being tested; absence of underlying diseases that could impair the study's evaluation or follow-up; good understanding and respect of the instruction for not using concomitant products, and not to undergo intense exposure to the sun during the course of the study.

The study was conducted according to the patient's safety recommendations issued by the Declaration of Helsinki 2000.

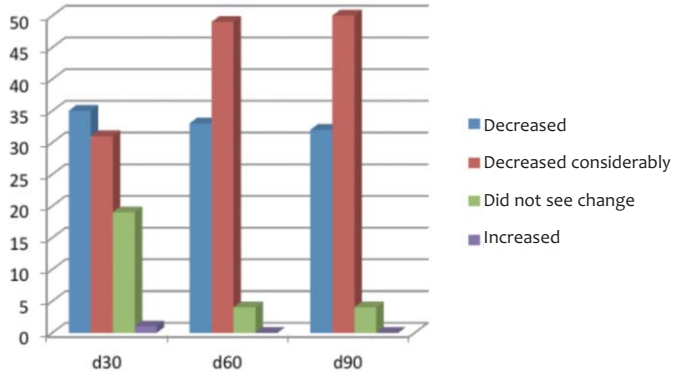
Individuals who were deemed to have developed a personal risk or interference in the objectives of the study, individuals with skin lesions in the areas to be assessed, patients with signs of intense sun exposure or who were pregnant or lactating, were excluded at the discretion of the investigators.

Thus, the studied patients were instructed to use the product under investigation (Hydraporin,® Mantecorp IndústriaQuímica e Farmacêutica S/A, Rio de Janeiro/RJ, Brazil), for 90 days (once at night, after bathing, at least 30 minutes before bedtime).

The results were evaluated through a clinical efficacy questionnaire (Figure 1) on days 0, 30, 60, and 90, with information on dryness, hydration, desquamation, itching and smoothness. At all visits the volunteers were also objectively evaluated on the inner side of the right arm (three measurements) and anterior face of the right leg (three measurements) with the assistance of corneometry, TEWL-metry and pH-metry.

Figure 1: Signs and symptoms evaluated in the Clinical Effectiveness questionnaire

SIGNS	Opacity
	Roughness
	Desquamation
	Erythema
	Excoriations
	Fissures
	Bleeding
	Lichenification
	Ichthyosis
SYMPTOMS	Roughness
	Pruritus
	Burning sensation
	Pain



Graph 1: Assessment of skin drynessduring the 90 days of use of the study'sproduct

RESULTS

Of the 100 volunteers previously selected, only 86 completed the study, with the following characteristics: phototype II (17.4%), phototype III (59.3%), phototype IV (23.3%), women (94.2%) and mean age = 44 years (range = 18-70 years old). Of the participants, 97% had relief of symptoms during the 90 days of product use ($p < 0.0001$).

In the first 30 days of product use, 94%of patients showed improvement in dryness (Graph 1); 82.5% in hydration (Table 1 and Graph 2); 81.4% in smoothness (Table 2 and Graph 3); 76.75% in desquamation (40%did not present that symptom on D0) (Chart 4); and 58.14% in itching (60%did not have that symptom on D0) (Graph 5).

During the 90-day study, all subjective efficacy variables analyzed showed clinical improvement. The results described below were found in the analysis of objective variables.

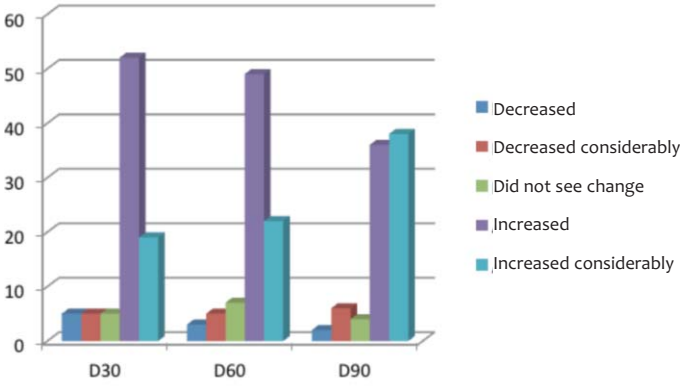
The pH (Graph 6 and Table 3) remained at physiological standards (D0: 5.16, D30: 5.42, D60: 5.72, D90: 5.79). The corneometry analysis (Graph 7 and Table 4) evidenced significant increase in the level of skin hydration (D0: 34.93, D30: 42.48, D60: 47.60, D60: 47.60). Both the pH-metry and the corneometry presented a statistically significant difference (p-value < 0.001). The TEWL-metry (Graph 8 and Table 5) ranged from D0: 7.93 to D90: 7.61, although without statistical significance (p-value = 0.1065).

In the final evaluation, 100% of participants rated the product as excellent (98.84%) and good (1.16%) (p-value < 0.001) (Table 6).

The role of the stratum corneum isas part of the epidermal barrier, protecting not only against chemical agents, but also

Table 1: Evaluation of skin hydration during the first 30 days of use of the study

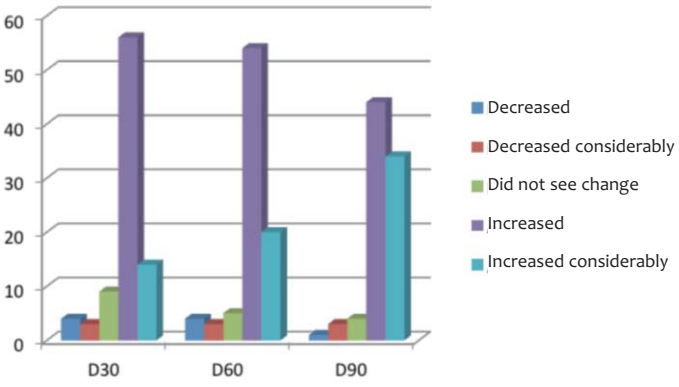
HYDRATION FREQUENCY	%	
Decreased	5	5.81
Decreased considerably	5	5.81
Did not see change	5	5.81
Increased	52	60.47
Increased considerably	19	22.09
Improved	71	82.56
Unchanged	5	5.81
Worsened	10	11.62



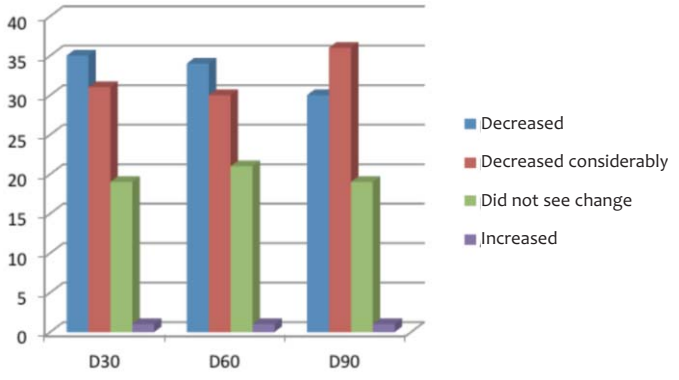
Graph 2: Assessment of skin hydration during the 90 days of use of the study'sproduct

Table 2: Evaluation of skin smoothness during the first 30 days of use of the study

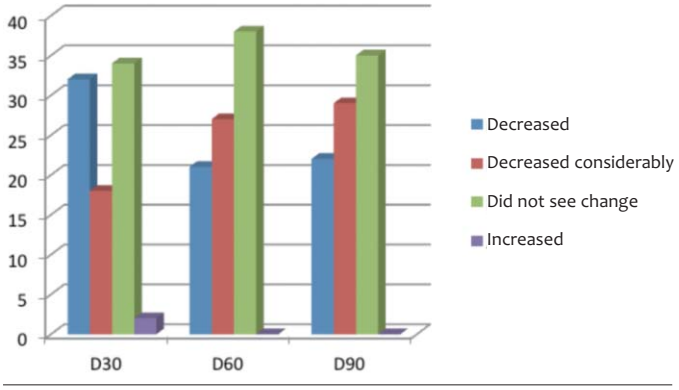
HYDRATION	FREQUENCY	%
Decreased	4	4.65
Decreased considerably	3	3.49
Did not see change	9	10.47
Increased	56	65.12
Increased considerably	14	16.28
Improved	70	81.40
Unchanged	9	10.47
Worsened	7	8.14



Graph 3: Evaluation of skin smoothness during the 90 days of use of the study'sproduct.



Graph 4: Evaluation of skin desquamation during the 90 days of use of the study'sproduct.

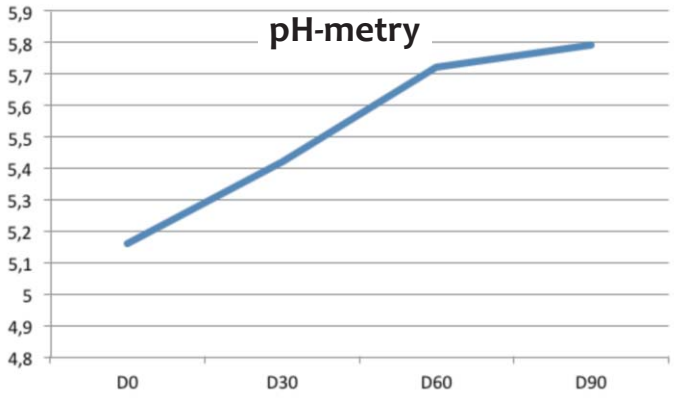


Graph 5: Evaluation of skin desquamation during the 90 days of use of the study's product

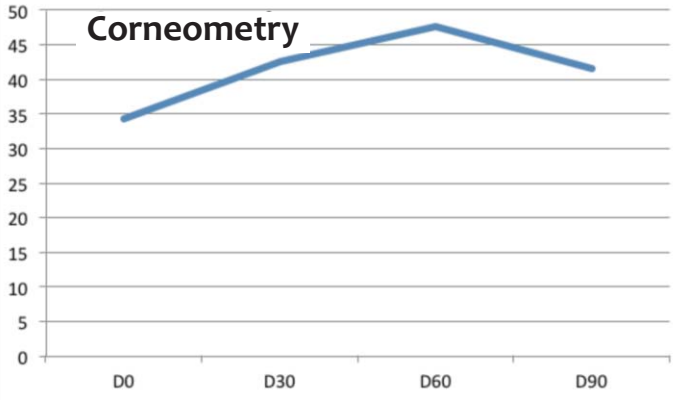
against microorganisms. A healthy stratum corneum has 20-35% water in its composition. If this amount is less than required, the skin surface will present fissures, thereby fulfilling the barrier's function insufficiently and inadequately. Dry skin can therefore be defined as a state where there is water loss from the stratum corneum, clinically compromising it.[16]

Cutaneous xerosis, however, is not a static mechanism. There are several intrinsic and extrinsic conditions that contribute to its manifestation, including changes in environmental humidity, skin degreasing (hot baths, excessive soap), solar radiation, emotional stress, physical trauma, and use of retinoids.[17]

In addition to these conditions, xerosis can also be secondary to skin diseases and physiological conditions typical of human beings, such as psoriasis, atopic dermatitis,



Graph 6: Evaluation of pH-metry during the 90 days of use of the study's product



Graph 7: Evaluation of corneometry during the 90 days of use of the study's product

Table 3: Evaluation of pH-metry during the 90 days of use of the study product

	pHmetria			
	D0	D30	D60	D90
Mean	5.16	5.42	5.72	5.79
Median	5.2	5.45	5.8	5.8
Standard-deviation	0.72	0.49	0.43	0.42
Min	2.5	4.0	4.9	4.7
Max	6.3	6.3	6.7	6.7
p-value	< 0,0001			

Table 4: Evaluation of corneometry during the 90 days of use of the study product

	corneometry			
D0	D30	D60	D90	
Mean	34.23	42.48	47.60	41.54
Median	34.50	42.25	47.0	41.9
Standard-deviation	9.41	11.38	11.43	11.25
Min	9.80	15.00	22.3	13.7
Max	60.90	67.10	79.70	67.3
p-value	< 0.0001			

senility,menopause, diabetes mellitus, hypothyroidism, and leprosy.[18-20]

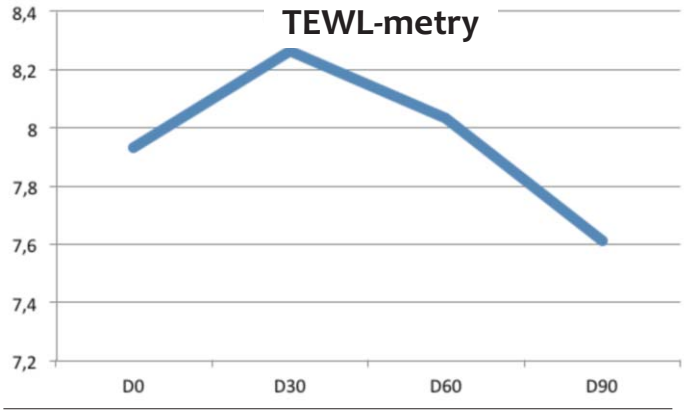
Under normal physiological conditions, the stratum corneum has a capacity for recovery. The stimulus of the removal of lipids increases the desquamation of corneocytes, triggering a series of phenomena, among which are the increased secretion of lamellar bodies (which in turn stimulates lipid synthesis), and the stimulation of the maturation of corneocytes (with the conversion of profilaggrin into filaggrin, aggregating keratin filaments). The skin remains dry when these normal compensatory mechanisms do not outweigh the stimuli that induce the loss of water. [17, 21]

Cutaneous xerosis becomes clinically evident when the water content in the stratum corneum is less than 10%. It manifests as cutaneous roughness, desquamation, fissures, tension, redness, and occasionally bleeding. It often causes significant discomfort and important cosmetic alterations, which demand appropriate treatment. [17]

The use of body moisturizers is undoubtedly the first step for the relief of signs and symptoms of this condition. The present paper offers the clinical outcome of approaching xerosis with the use for 90 days of an innovative moisturizing formula—especially due to the presence of substances in its formulation that stimulate the sound functioning of aquaporins.[22] Using Hydraporin,® there was complete or marked clinical improvement in 89.54% of volunteers, according to the medical evaluation. There was an average reduction from 3.83 to 0.55 in the clinical signs and symptoms ratings during the 90 days of the study (p-value < 0.0001). This assessment was based on a clinical questionnaire, in which the signs and symptoms considered by the physicians were: opacity, roughness, desquamation, erythema, excoriation, fissure, bleeding, lichenification, ichthyosis,pruritus, burning sensation,and pain. For each item (when it occurred) a rating was assigned. Therefore, the final sum of the ratings was directly related to the severity of the xerosis.

According to the corneometry evaluation, the objective method for assessing skin hydration, there was a statistically significant increase after 90 days of use, with average ratings ranging from 34.23 in D0 to 41.54 in D90.

Regarding the assessment of transepidermal water loss, measured through TEWL-metry, there was an increase in the first 30 days. This occurred due to the fact that the moisturizer in question had a proportionally smaller amount of occlusive substances than emollients and humectants, in its formulation. Thus, due to dryness of the volunteers' skin, with the start of the use of Hydraporin® there was a recruitment of water from the dermis to the epidermis by the moisturizing substances, slightly increasing the transepidermal water loss (D0: 7.93 and D30:



Graph 8: Evaluation of TEWL-metry during the 90 days of use of the study's product

Table 5: Evaluation of TEWL-metry during the 90 days of use of the study product.

	TEWLMETRIA			
	D0	D30	D60	D90
Média	7.93	8.26	8.03	7.61
Mediana	7.57	8.18	7.86	7.65
Desvio Padrão	2.42	2.44	2.37	2.36
Mínimo	2.88	1.98	3.11	0.71
Máximo	17.38	15.87	14.3	13.05
p-valor	0.1065			

Table 6: Final evaluation of the product by the volunteers on D30, D60, and D90

	D30		D60		D90	
	Frequency	%	Frequency	%	Frequency	%
Excellent	85	98.84	85	98.84	85	98.84
Good	1	1.16	1	1.16	1	1.16
Regular	0	0	0	0	0	0
Bad	0	0	0	0	0	0

8.26). However, shortly after, when the skin was already hydrated, there was a progressive reduction of the TEWL. On D60 it rated 7.86 while at the end of the study it reached a rating lower than the initial (D90: 7.65).

The pH indices remained at physiological standards throughout the study, with the mean value ranging from 5.16 to in D0 to 5.79 in D90. It is important to note that the pH of a normal epidermis is slightly acidic, due primarily to sebum and sweat secretions, and that it is of the utmost importance for the properties of the stratum corneum and the flora ecosystem. [23]

Regarding the perceived effectiveness from the perspective of the volunteers, at the end of the study (D90), 95.35% of them reported improvement in dryness; 91.7% in smoothness; 86.05% in hydration; and 76.74% in desquamation. On D30, there was a statistically significant improvement (p-value < 0.0001) of signs and symptoms: 94.19% of participants noticed improvement in dryness; 81.40% in the smoothness; 82.56% in hydration; and 76.75% in desquamation. These can be deemed considerable amounts, especially in light of the discomfort caused by dryness and desquamation.

Regarding pruritus, as most of the volunteers (60%) did not refer to it on D0, the change in the score during the study was not statistically significant. There was a balance between the reduction in the itching and an absence of alterations.

When a medical treatment is established, the objective is that its effectiveness be clearly perceived by the prescriber, and also by the patient. At the end of the present study, the improvement in xerosis was perceived in similar ways and with excellent results both by researchers and volunteers. Based on the questionnaire of the volunteers' opinions, the product proved to have a good scent and was considered easy to spread, had good consistency and absorption, and was considered good or very good by 97.6% of participants.

Regarding the tolerability of the Hydraporin®, 100% of the volunteers rated the product as excellent (98.84%) and good (1.16%). Only one product-related adverse event took place: a slight increase in cutaneous oiliness was referred by only one volunteer on D60, which was normalized with the continued use of the product.

CONCLUSION

Cutaneous hydration is a subject of great importance, as xerosis, both of primary or secondary origin, is a very common condition confronted by dermatologists.

Cosmetics companies are increasingly investing in this field, where research is increasingly specialized and detailed. The entailed scientific and technological advancement contributes providing a base for the medical choice of moisturizers. After the clinical outcomes of the present study, it was shown that Hydraporin® is effective in significantly increasing skin hydration (according to corneometry) and extremely efficient in treating signs and symptoms of skin xerosis, according to the assessment of physicians and volunteer patients.

These results therefore validate the product as an effective therapeutic option in cases of cutaneous xerosis, irrespective of the clinical condition, associated or precipitating.●

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Perioral rejuvenation with fractional carbon dioxide (CO2)laser

Rejuvenescimento Perioral com Laser de Dióxido de Carbono (CO2) Fracionado

Article
Original

ABSTRACT

Introduction: Several therapeutic modalities, such as surgeries, cutaneous filling, and ablative techniques are used for perioral rejuvenation.
Objective: The present study was aimed at evaluating the efficacy and side effects of an ablative method, using fractional carbon dioxide (CO_2) laser in the treatment of perioral wrinkles.
Methods: A retrospective study was carried out with 20 female patients who underwent a single session of fractional CO_2 laser, with high energy and density, for the treatment of perioral wrinkles. Photographs taken before and 90-days after the procedure were evaluated by two examiners unrelated to the study, who looked at the effect of the laser on the deep static wrinkles, fine lines, skin texture, and color. The patients were also classified, pre-and post-treatment, according to the classification of Baker for perioral wrinkles.
Results: Three months after the treatment, it was possible to observe clinical improvement in 100% of the patients, in all the variables evaluated. In the classification of Baker, five patients classified as Grade II, and three who classified as grade III became Grade I and Grade II, respectively. Patients initially classified as Grade I did not have alterations in their classification for presenting few superficial wrinkles. Observed side effects were: transient erythema and edema in the early post-procedure period.
Conclusion: Fractional CO_2 laser has proven to be a safe and effective option for the treatment of perioral wrinkles.

Keywords: skin aging; laser therapy; carbon dioxide.

RESUMO

Introdução: diversas modalidades terapêuticas são utilizadas para o rejuvenescimento perioral, como cirurgias, preenchimentos e técnicas ablativas.
Objetivo: o objetivo deste estudo é avaliar a eficácia e os efeitos colaterais do uso de método ablativo, utilizando-se o laser de Dióxido de Carbono (CO_2) fracionado no tratamento das rugas periorais.
Métodos: realizado estudo retrospectivo com 20 pacientes do sexo feminino submetidas à aplicação do laser de CO_2 fracionado, em sessão única, com alta energia e alta densidade, para o tratamento das rugas periorais. As fotografias antes e 90 dias depois do tratamento foram avaliadas por dois examinadores alheios ao estudo, que observaram o efeito do laser nas rugas estáticas profundas, linhas finas, tonalidade e textura da pele. As pacientes também foram catalogadas, no pré e pós- tratamento, conforme a classificação de Baker para rugas periorais.
Resultados:três meses após o tratamento foi possível observar melhora clínica em 100% das pacientes, em todos os quesitos avaliados. Na classificação de Baker, cinco pacientes catalogadas como grau II e três, como grau III tornaram-se respectivamente grau I e grau II. Pacientes rotuladas como grau I, por apresentarem poucas rugas superficiais, não tiveram alteração nessa classificação. Os efeitos colaterais observados foram eritema e edema transitórios, no período de pós-procedimento imediato.
Conclusão: o laser de CO_2 fracionado demonstrou ser opção segura e eficaz para o tratamento das rugas periorais.

Palavras-chave: envelhecimento da pele; terapia a laser; dióxido de carbono.

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INTRODUCTION

Aging in the perioral and lower third regions of the face contributes significantly to the final result of facial aging. [1]

Resulting from chewing and speech movements, perioral wrinkles are dynamic in their early stages, becoming more static during advanced aging, [2,3] Other factors also contribute to the aging process in this area of the body, for instance, actinic damage, sagging of the adipose tissue of the middle and lower thirds of the face, and the looseness of the osteocutaneous ligaments. [1]

In 1998, Baker classified perioral wrinkles into three types, based on their number, location, and depth. Those of Type I are deemed superficial and can affect a third to half of the upper lip, and are eight or fewer in number; Type II are deemed as moderate, present in more than two thirds of the upper lip, and range in number from 9 to 15; and Type III are deemed as deep, affecting the upper and lower lips in numbers greater than 16. [4]

The perioral region has anatomical characteristics that make it responsive to different types of rejuvenating treatments, including surgeries, cutaneous fillings, and ablative techniques, such as chemical peels, dermabrasion, and ablative lasers, which promote the ablation of the epidermis and part of the dermis.[2,3] The treatments that yield the best results for these wrinkles are the ablative processes,[3] which can be used separately or combined to optimize results. [5]

Traditional CO_2 and Erbium:YAG (non-fractional) ablative lasers, deep peels, and dermabrasion yield highly satisfactory results, however they have the disadvantage of low patient acceptance due to the need for effective anesthesia, prolonged recovery, increased risk of depigmentation and scars, more complicated post-operative care and a risk of prolonged residual erythema, demanding strict restrictions to exposure to the sun. [6]

As a result, fractional lasers have been gaining popularity more recently due to their less intense side effects, decreased recovery time, and significant clinical outcomes. [6]

The present study was aimed at evaluating the clinical efficacy and possible side effects of using fractional CO_2 laser in the treatment of static perioral wrinkles. A single protocol, with high energy and high density, was proposed as treatment.

METHOD

A retrospective study was conducted between 2007 and 2011 at a private practice, when 20 female patients aged between 50 and 70 years old, with skin phototypes I, II, III, and IV were evaluated and subsequently underwent treatment of perioral wrinkles with fractional CO_2 laser (SmartXide ® - dot, 10,600 - Dekalaser, Firenze, Italy).

Prior to undergoing the procedure, all patients read and signed an informed term of consent, with the study being conducted according to the Declaration of Helsinki's recommendations. The exclusion criteria for undergoing the application of fractional CO_2 laser were: use of systemic isotretinoin in the previous six months, pregnancy, and presence of infection in the body site to be treated on the day of the procedure. Patients with a previous history of infection with herpes simplex virus began prophylaxis with antiviral drugs two days before the laser application.

All patients were photographed in a standardized way with regards to the camera, lighting, and distance, before the procedure and after 30 and 90 days (Visia® system, Canfield Imaging Systems, NJ, USA). The perioral wrinkles were classified according to the Baker's scale[3] by two examiners (dermatologist physicians) unrelated to the study. Treatment site antisepsis was performed prior to the procedure with aqueous chlorhexidine and, due to the painful nature of the procedure, regional blocks was carried out in the infraorbital and mentonian nerves bilaterally with 2% lidocaine and 1:100,000 epinephrine. Patients underwent a single treatment session with two passes of fractional CO2 laser in the perioral region, observing the following parameters: power = 30W, spacing= 1,000mm, dwell time (depth) = 2,000ms, and stack 2. In case the patient also underwent treatment onthe rest of the face, an interval of 30 minutes was observed before the new laser application, with the use of topical anesthesia, and skin cooling with cold air (Siberian® - Industra Technologies, São Carlos (SP), Brazil) during the procedure, since injectable anesthesia was not used, with the exception of the perioral region. In the remaining areas of the face there was no standardization of laser parameters in those patients, although a certain criteria was observed.

After the procedure the patient remained with a cold gel mask for 10 minutes. Patients were instructed to use soap for cleaning sensitive skin, silicone gel hydration at home, and sunscreens to assist with re-epithelialization. Red spectrum LED (light emitting diode) (Multiwaves® - Industra Technologies, São Carlos, SP, Brazil), analogous to low-power lasers, was used immediately after the laser application for its anti-inflammatory and healing effect.[7] Although systemic antibiotics and antifungals can be prescribed as prophylaxis or on the occurrence of clinical signs of bacterial infection or candidiasis, the authors deemed them an unnecessary resource and they were not used in the study patients.

Atreturn visits after the procedure, the patients were evaluated regarding possible side effects. In the literature, the authors found descriptions of minor complications: erythema, edema, acneiform eruption, milia, purpura and superficial erosions; moderate complications: persistent erythema, bacterial infection, activation of herpes simplex, hyperpigmentation; and even serious complications such as hypertrophic scarring and ectropion.[5]

In post-procedure photographic records, the action of the treatment on deep wrinkles, fine lines, skin tone, and texture was considered. These characteristics were assessed according to the following rating: absence of improvement (-), slight improvement (1-25%), moderate improvement (26-50%), significant improvement (51-75%) and very significant improvement (76-100%). Three months after the procedure a further assessment of patients based on perioral wrinkles classification was carried out according to the Baker's scale.

RESULTS

Twenty patients who underwent a single fractional CO_2 laser application session in the perioral region (two passes; 30W;

1,000mm spacing; 2,000ms dwell time; stack 2) were evaluated.

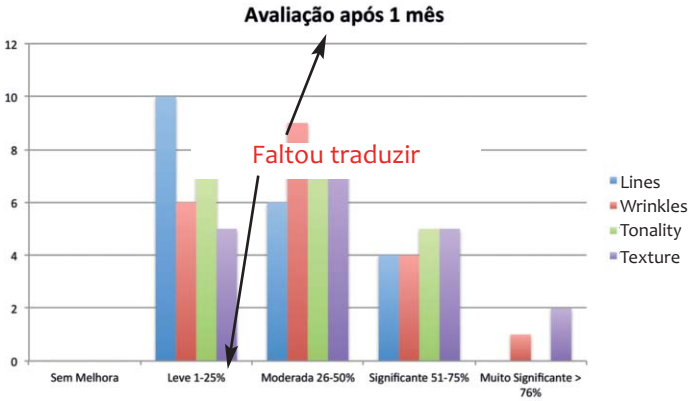
When initially classified according to the Baker's scale, five patients in our sample had Grade I, eight had Grade II, and seven had Grade III.

Three months after the procedure, patients were photographed and re-classified according to the same scale. We observed that five patients previously classified as Grade II and three patients classified as Grade III became, respectively, Grade I and Grade II. Those initially rated as Grade I who had a positive response to the treatment, but still showed some superficial wrinkles, remained as Grade I.

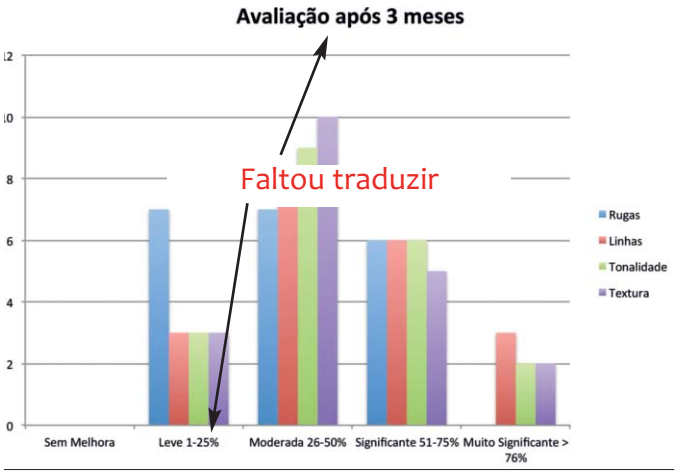
The examiners assessed the action of the laser on deep wrinkles and fine lines, as well as on the toneand texture of the skin. The improvement was classified as slight (when an attenuation of 1-25% of the criteria abovewas observed), moderate (26-50%), significant (51-75%), very significant (over 76%) or with absence of improvement.

Thirty days after the procedure, the assessment of fine lines suggested 6 patients had slight improvement; 9 had moderate improvement; 4 had significant improvement; and 1 had very significant improvement. Regarding deep wrinkles, 10 patients had slight improvement; 6 had moderate; and 4 had significant; regarding tonality, 7 patients had slight improvement; 8 had moderate; and 5 had significant improvement; regarding texture, 5 patients had slight improvement; 8 had moderate improvement; 5 significant improvement; and 2 had very significant improvement (Graph 1).

As depicted in Graph 2, at 90 days after the procedure it could be observed that regarding deep wrinkles, 7 patients had slight improvement; 7 moderate; and 6 significant; for fine lines, 3 patients showed slight improvement; 8, moderate; 6 significant; and 3 very significant; regarding skin tone, 3 showed slight improvement; 9 moderate; 6 significant; and 2 very significant; finally, with respect to texture, 3 patients showed slight improvement; 10 moderate improvement; 5 significant improvement; and 2 very significant improvement.



Graph 1: Evaluation after 1 month. Distribution of patients according to the degree of improvement after 1 month



Graph 2: Evaluation after 3 months. Distribution of patients according to the degree of improvement after 3 months

Figures 1 and 2 illustrate the clinical improvement in two patients after three months of treatment. Regarding side effects, erythema and edema could be observed predominantly in the first week after the procedure in all patients. These side effects receded spontaneously in 100% of cases. No other side effects were observed in the present study.

DISCUSSION

According to the present study's results, which were evaluated by two examiner dermatologists unrelated to the research being carried out, it was possible to verify clinical improvement in all patients. Since the first month of follow-up, it was possible to note clinical improvement in all the variables assessed, i.e., no patient was classified by "absence of improvement".

It was possible to confirm the clinical improvement in the mitigation of perioral wrinkles, even in the most severe cases of aging in that body site (8 patients), through improvements of one to two grades in the Baker's classification.

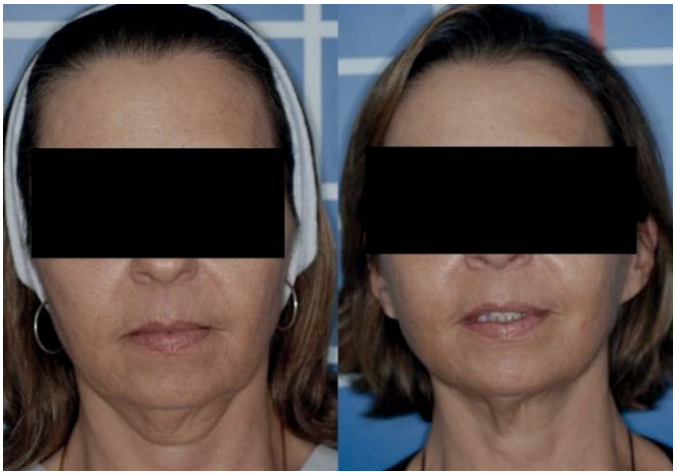


Figure 1: D0 to D90

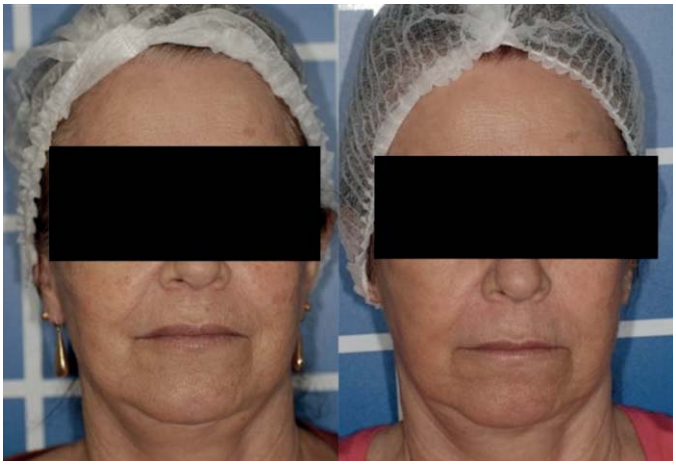


Figure 2: D0 to D90

The present study's findings are consistent with the literature,[5,6] confirming the use of the fractional CO_2 laser as an effective treatment for static perioral wrinkles.

Mitigation of deep wrinkles and fine lines and the improvement in the tone and texture of the skin were observed from the first month after treatment, although there was more noticeable improvement in the third month of follow-up. The fact that the laser's effect was better rated three months after the procedure is linked to the remodeling of collagen, which continues to occur three months or more after the skin has been exposed to the laser, clinically translating into the long-term effect of the treatment. [8, 9]

This finding leads to the reconsideration of the time interval in which the indication of new sessions of fractional CO2 lasercurrently occurs. If the study's patients were reassessed after more than three months, better results would probably arise for the variables analyzed.

Regarding the observed side effects, although the present study's sample had only 20 patients, no moderate or severe complications were observed, which suggests a good safety profile for the procedure. Further studies on the application of fractional CO2 laser for perioral wrinkles, with different standardizations of use and other assessment methods (such as pathological studies, for instance), with longer followup times and with broader sample sizes may corroborate our clinical findings.

CONCLUSION

Fractional CO_2 laser is safe and effective for the treatment of perioral wrinkles, presenting a high degree of satisfaction in the post-procedure evaluations and a low incidence of complications. ●

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Article
Original

Treatment of first-degree burns with andiroba oil emulsion: a prospective, comparative, double-blind study

Tratamento da queimadura de primeiro grau com emulsão de óleo de andiroba: estudo prospectivo, comparativo e duplo-cego

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ABSTRACT

Introduction: *First-degree burns can cause intense pain and, in the medium- and long-term, sequelae. In a previous study, the authors found that an emulsion of andiroba oil and desonide—a low potency corticosteroid—were equivalent for relieving pain and improving erythema caused by intense pulsed light-based epilation. The andiroba oil emulsion is used for treating radiation dermatitis in patients with breast cancer,through local application, before and after radiotherapy.*

Objective: *To confirm the previous study's results and evaluate whether a pre-procedure program of preparation and prevention provides any benefit.*

Methods: *A prospective, comparative, double-blind study was carried out with 33 patients, who blindly used andiroba oil emulsion and a humectant in the axillae (each product was applied on one side) before the epilation procedure. Epilation was performed using intense pulsed light, with parameters according to the skin phototype of the patients. After the procedure, the andiroba oil emulsion was applied on the side that had been prepared with the emulsion itself, while the desonide was applied on the contralateral axilla. Patients assessed pain intensity according to a visual analogue scale, and a dermatologist assessed the erythema using a modified scale, at several experimental time points.*

Results: *Pain and erythema were less intense in the side prepared with the andiroba oil emulsion. The efficacy of both treatments proved to be equivalent.*

Conclusions: *Thee fficacy and safety of the andiroba oil-based emulsion, as well as its protective effect on the skin in the pre-treatment preparation program, were confirmed in clinical use.*

Keywords: *burns; hair removal; glucocorticoids; wetting agents.*

RESUMO

Introdução: no estudo-piloto, os autores constataram equivalência na eficácia e segurança da emulsão à base de óleo de andiroba e da desonida no alívio da dor e eritema causada pela depilação com luz intensa pulsada. A emulsão à base de óleo de andiroba é usada na prevenção e tratamento de radiodermatite em mulheres com câncer de mama.

Objetivo: confirmar os resultados do estudo-piloto, com 33 pacientes, e avaliar se há benefício no esquema de prevenção prévio ao procedimento.

Método: estudo prospectivo, comparativo e duplo-cego. As axilas foram preparadas uma com emulsão à base de óleo de andiroba, outra com hidratante. O tratamento pós-depilação foi com a emulsão à base de óleo de andiroba no lado com ela preparado e com desonida no outro. Cada paciente avaliou a dor seguindo a escala analógica visual, e o eritema foi avaliado pela dermatologista cegada segundo a escala de eritema modificada.

Resultados: a dor e o eritema foram menores no lado preparado com a emulsão à base de óleo de andiroba, e ao longo do tratamento, a eficácia dos dois tratamentos foi equivalente.

Conclusão: confirmou-se a eficácia e a segurança da emulsão à base de óleo de andiroba no uso clínico, e o efeito protetor da pele com o esquema de preparo prévio.

Palavras-chave: queimaduras; remoção de cabelo; glucocorticoides; umectantes.

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INTRODUCTION

Burns are one of the most common household and workplace accidents in modern society. First-degree and superficial second-degree burns are self-limited and heal without leaving scars. However, intense pain and medium- to long-term sequelae may remain as a function of the type and frequency of the burns, e.g., ionizing radiation.[1,2] First-degree burns are not considered a serious problem, and until recently, there was no "ideal" or efficacious treatment for the pain and inflammatory reactions caused by various types of first-degree burns, e.g., scalding, exposure to sunlight, ionizing radiation, etc.[3]

An emulsion based on crabwood oil (COE), also known by its commercial brand Tegum,® has been used in the prevention and treatment of radiation dermatitis, post-chemotherapy skin sequelae, decubitus ulcers, and post photo-epilation burns. In a previous pilot study conducted by the present authors on nine patients, intense pulsed light (IPL) photoepilation was an optimal experimental model to investigate the treatment of first-degree burns because the burns that occurred as side effects were controlled based on the patient's phototype.[4] Therefore, the therapeutic effect of COE used on one side of the patient could be compared to the effects of the low-potency corticoid desonide applied on the other side of the patient. A comparison was thus performed at the individual level using a double-blind model, in which the patients were asked to assess the progression of pain in the treatments, and the medical observer assessed the changes in erythema. The previous pilot study concluded that COE was efficacious, safe, and comparable to desonide in regards to pain relief and the reduction of inflammation associated with first-degree burns.[4] The aim of the present study was to confirm the previous results using 33 patients and statistical analyses. We also aimed to establish whether a seven-day COE treatment prior to epilation is beneficial according to the protocol for the prevention and treatment of radiation dermatitis.

METHOD

The present prospective, comparative, double-blind study was conducted on 33 patients. The inclusion criteria were female gender, 18 to 45 years old, phototypes I to III on the Fitzpatrick scale, and healthy skin at the axillae. The exclusion criteria were active dermatosis; skin spots at the axillae; pregnancy or breastfeeding; allergies to the tested agents; intense exposure to the sun 15 days prior to the experiment; a history of illness aggravated or triggered by ultraviolet radiation; the use of immunosuppressants, anti-histamines, non-hormonal anti-inflammatory agents, or systemic corticoids up to two weeks before the experimental procedure; the use of oral or topical vitamin A acid and/or derivatives up to one month before the experimental procedure; cosmetic or dermatological treatment involving the axillae one month before the study; immunodeficiency; a history of atopy; dermographism; previous or ongoing participation in other clinical studies that ended fewer than seven days before recruitment; or professionals involved or interested in the study. The aims and procedures of the study were explained to the participants who fulfilled the inclusion and exclusion criteria. The participants were then asked to sign an informed consent form. The study was conducted in compliance with the norms recommended by the 2000 Declaration of Helsinki.

The participants were assessed and requested to prepare for the experimental procedure in the following manner: beginning seven days prior, the participants used COE on one axilla three times per day and a hydrating cream on the opposite axilla, which had a color, odor, and consistency identical to COE. The hydrating cream and the COE were delivered in identical containers randomly labeled "right" or "left". No product, local or systemic analgesics, or anti-inflammatory agents were used on the day of the procedure. The participants' axillae were epilated by a dermatologist using the standard IPL method with the parameters adjusted to the patients' phototype and the device instructions. The participants assessed pain by comparing both axillae on a visual analogue scale (VAS) ranging from 0 (zero), no pain, to 10, maximum pain (Figure 1). Subsequently, a second dermatologist assessed inflammation as a function of the degree of erythema according to a modified color scale ranging from 0 (zero), no erythema, to 10, maximum erythema (Figure 2). Both the patient and the assessing dermatologist were blind to the

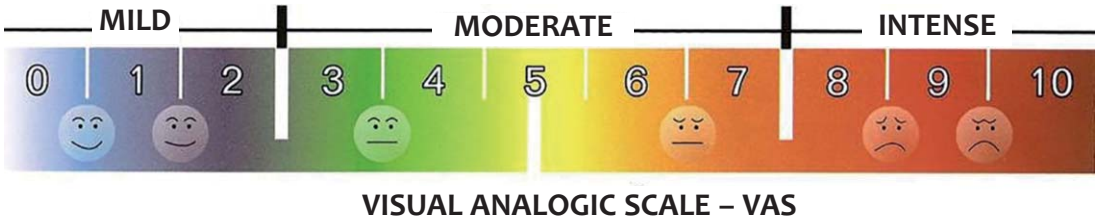


Figure 1: Visual analogic scale

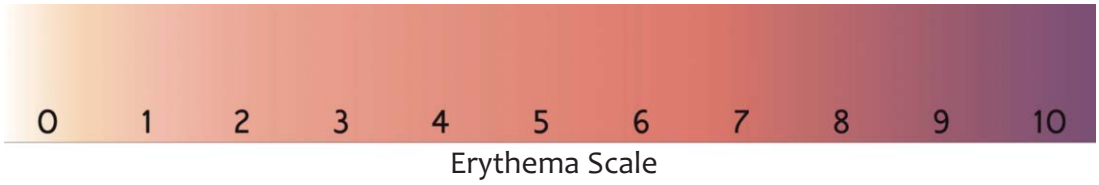


Figure 2: Chromatic scale for evaluation of erythema

product applied to the axillae during the preparation stage or procedure.

Pain and inflammation were assessed at the following time points: T0—immediately after epilation; T1—immediately after application of the test products on the axillae; T2—15 minutes after application of the test products; T3—30 minutes after application of the test products; T4—60 minutes after application of the test products; and T5—seven days after the procedure (Table 1).

Statistical methods

A Wilcoxon signed-rank test was used in an inferential analysis to establish whether there was significant variation in the pain and erythema scores and in the absolute and relative deltas of the scores following treatment with desonide and COE. Non-parametric tests were used because the scores did not exhibit a Gaussian distribution, as a function of the discrete nature of the data, and the assumption of normality was rejected by a Kolmogorov-Smirnov test. The significance level was established as 5%. The statistical analyses were performed using the SAS 6.11 software (SAS Institute, Inc., Cary, NC).

Table 1: Evaluation of pain and inflammation timepoints

T0	Immediately after epilation
T1	Immediately after the application of products.
T2	15 minutes after the application of products
T3	30 minutes after the application of products
T4	60 minutes after the application of products
T5	7 days after the application of products

RESULTS

The significant variation in the pain and erythema scores following treatment with desonide and COE was investigated. Table 2 describes the means, standard deviations (SD), and medians of the pain and erythema scores at each time point per treatment (desonide and COE) and the descriptive level of the Wilcoxon signed-rank test (*p value*). A Friedman's ANOVA was performed separately for each treatment to establish whether there was a significant decrease in the scores at the five time points.

The pain ($p < 0.0001$) and erythema ($p < 0.0001$) scores significantly decreased in both treatments, which emphasizes the efficacy of both medications. Treatment with COE was associated with significantly lower pain scores at **T0** ($p = 0.039$) and significantly lower erythema scores at **T0** ($p = 0.0001$), **T1** ($p = 0.0001$), and **T2** ($p = 0.048$) compared to desonide (Graphs 3 and 4).

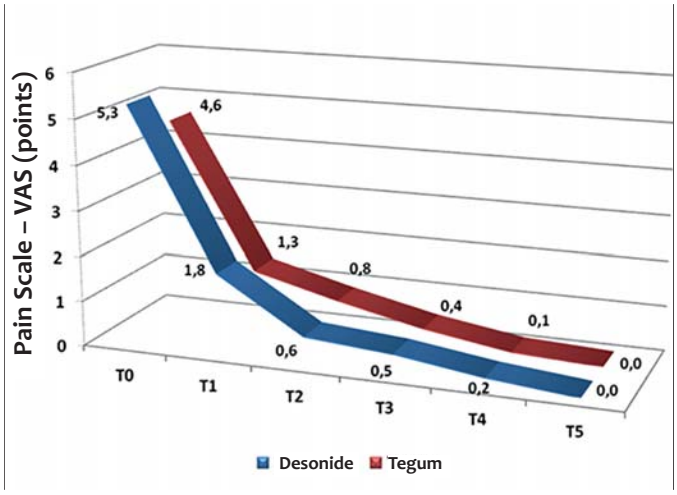
Additionally, the significant variation in the absolute and relative deltas of the pain and erythema scores was investigated for both treatments. Tables 3 and 4 describe the means, SD, and medians of the absolute (scores) and relative (percentage) deltas at each time point per treatment (desonide and COE) and the corresponding descriptive level of the Wilcoxon signed-rank tests (*p value*). Absolute delta corresponds to the variation between two time points, e.g., T1 to T0, expressed as scores. Negative absolute delta indicates the score reduction from T0 to T1. Relative delta corresponds to the percentage of variation between T1 and T0, (T1—T0) / T0 x 100. Negative relative delta indicates the percentage of reduction relative to T0.

In addition, the relative variation was investigated because a significant difference was observed in the pain and erythema scores between the treatments at T0, i.e., the treatments differed at the baseline.

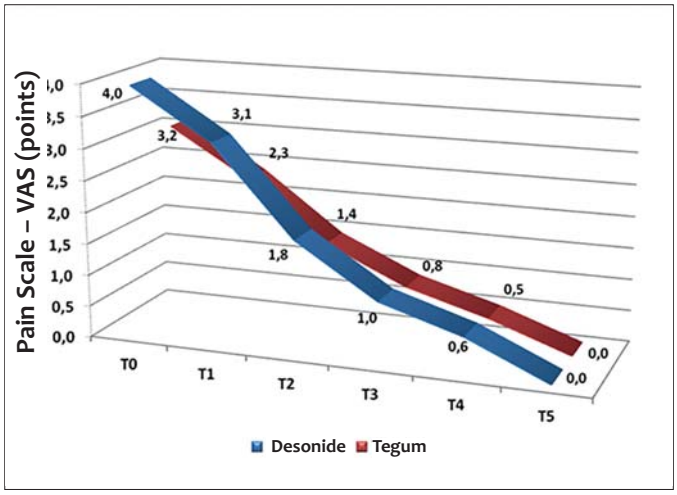
Table 2: Assessment of pain and erythema at each timepoint according to the treatment

VAS	timepoint	Desonide Mean	± SD	Median	Tegum® Mean	± SD	Median	p valor[1]
Pain scores	T0	5.30	± 2.48	5	4.58	± 2.44	4	0.039
	T1	1.79	± 1.75	2	1.30	± 1.88	0	0.23
	T2	0.61	± 1.27	0	0.82	± 1.36	0	0.49
	T3	0.45	± 1.23	0	0.39	± 0.75	0	0.90
	T4	0.18	± 0.64	0	0.09	± 0.29	0	0.66
	T5	0.00	± 0.00	0	0.00	± 0.00	0	NSA
	p valor[2]		**< 0,0001**			**< 0,0001**		
Erythema scores	T0	3.97	± 1.49	4	3.09	± 1.33	3	0.0001
	T1	3.18	± 1.76	3	2.33	± 1.43	2	0.0001
	T2	1.79	± 1.49	1	1.39	± 1.50	1	0.048
	T3	0.97	± 1.29	1	0.82	± 1.18	0	0.46
	T4	0.58	± 1.12	0	0.45	± 1.06	0	0.50
	T5	0.00	± 0.00	0	0.00	± 0.00	0	NSA
	p valor[2]		**< 0,0001**			**< 0,0001**		

Abbreviations: SD: standard deviation; NA: non-applicable.[1] Wilcoxon signed-rank test.[2] Friedman's ANOVA of each treatment separately.



Graph 1: Comparative scale of the mean values of the behavior of pain (during and immediately after the treatment)



Graph 2: Comparative scale of the mean values of the behavior of erythema (during and immediately after the treatment)

Treatment with COE was associated with an absolute reduction in pain scale scores, which were significantly lower compared to the desonide treatment at T2 ($p = 0.001$), T3 ($p = 0.020$), and T5 ($p = 0.039$) relative to T0. No significant relative reduction (%) was observed at any time point between the treatments.

Treatment with COE was associated with an absolute reduction in the erythema scale scores, which were significantly lower compared to the desonide scores at T2 ($p = 0.008$), T3 ($p = 0.0001$), T4 ($p = 0.0001$), and T5 ($p = 0.0001$) relative to T0. No significant relative reduction (%) was observed at any time point between the treatments.

The pain and erythema baseline scores for the COE treatment were significantly lower (approximately one point) compared to desonide; however, COE exhibited a significantly smaller decrease compared to desonide (approximately one point), thus indicating a "compensation". Therefore, COE induced a similar percentage of reduction compared to desonide and achieved similar levels on the VAS beginning at T1 for pain and T3 for erythema. There was a significant difference when the descriptive level (*p value*) ranged from 0.05 to 0.10.

DISCUSSION

The equivalent efficacy of COE and desonide regarding pain relief and the improvement of erythema in first-degree burns was confirmed. The axilla previously prepared with COE exhibited less pain and erythema immediately after the induction of burns compared to the axilla prepared using the placebo and treated with desonide. These results might indicate that COE has a protective effect when it is used seven days prior to a radiotherapy procedure according to the protocol for skin preparation in patients with breast cancer.

First-degree burns are described as limited to the epidermis; however, injury might not be apparent and might extend into deeper layers and generate permanent sequelae. Following thermal aggression, the burned area exhibits a central area of necrosis and a peripheral area of stasis surrounded by hyperemia.[5] For sunburns, ultraviolet radiation causes irreversible damage to the cell DNA, leading to early aging and neoplasms over time.[6] In the acute phase, an inflammatory reaction occurs with the release of cytokines and free radicals and the activation of mast cells, which perpetuate pain and hyperalgesia.[7] Laser burns are classified as photothermal, photomechanical, and photochemical; of these, the thermal variety is the most significant.[8] Radiation causes free radical production, which results in oxidative stress and damage to cell DNA.[1,2]

Rupture of the protective barrier and homeostasis of the corneal layer is common to all varieties of superficial burns, as is the production of free radicals and inflammation, which make pain more intense and may perpetuate tissue injury. An ideal treatment involves topical replacement of the intracellular lipids (cholesterol, free fatty acids, and ceramide) that compose the corneal barrier to induce quick replacement and control fluid loss and exert anti-inflammatory and anti-oxidative effects to reduce tissue damage and pain.[8] Several agents were tested as treatments for superficial burns. In a review performed by Han and Maibach (2004) on the prevention and treatment of sunburns, topical d-alpha tocopherol reduced swelling, erythema, and skin sensitivity induced by ultraviolet radiation in hairless mice. The authors' review concluded that there are no clinical studies showing that corticosteroids, non-steroidal anti-inflammatory, anti-histamine, or anti-oxidant agents effectively treat acute sunburns and that the most reasonable treatment is to induce symptom relief using emollients and pain control medication.[6] Vaseline® petroleum jelly occludes and blocks skin perspiration; however, Xu and Xiao (2003) observed that it might "suffocate" and macerate the tissue.[9] In a study on burn-wound healing in mice that compared three treatments and a control without a treatment, the Vaseline®-treated group exhibited fewer contractions compared to the controls.[10] Corticosteroids are the most powerful anti-inflammatory agents, but their atrophic action extends across the epidermis and dermis and causes a nearly immediate reduction of extracellular production, mainly of hyaluronans.[11,12] The immediate cooling of burns might relieve pain but does not prevent secondary hyperalgesia.[7]

Depending on its composition, an emulsion might contribute more than symptom relief and hydration to treating first-

Table 3: Absolute and relative deltas of the pain scores at each time point per treatment

Delta		Desonide Mean	± SD		Median	Tegum Mean	± SD		Median	p valor[1]
Absolute (points)	T1 - T0	-3.52	±	2.12	-3	-3.27	±	2.14	-3	0.38
	T2 - T0	-4.70	±	2.49	-5	-3.76	±	2.44	-4	0.001
	T3 - T0	-4.85	±	2.60	-5	-4.18	±	2.47	-4	0.020
	T4 - T0	-5.12	±	2.53	-5	-4.48	±	2.40	-4	0.059
	T5 - T0	-5.30	±	2.48	-5	-4.58	±	2.44	-4	0.039
Relative (%)	T1 - T0	-67.1	±	29.8	-66,7	-75.7	±	31.4	-100	0.074
	T2 - T0	-88.4	±	24.5	-100	-81.2	±	34.9	-100	0.41
	T3 - T0	-90.8	±	25.6	-100	-89.2	±	25.3	-100	0.68
	T4 - T0	-96.6	±	12.2	-100	-97.7	±	9.1	-100	0.91
	T5 - T0	-100.0	±	0.0	-100	-100.0	±	0.0	-100	NSA

Abbreviations: SD: standard deviation; NA: non-applicable. [1] Wilcoxon signed-rank test

Tabela 4: Absolute and relative deltas of the erythema scores at each time point per treatment

Delta		Desonide Mean	± SD		Median	Tegum Mean	± SD		Median	p valor[1]
Absolute (points)	T1 - T0	-0.79	±	0.78	-1	-0.76	±	0.66	-1	1
	T2 - T0	-2.18	±	1.10	-2	-1.70	±	1.02	-2	0.008
	T3 - T0	-3.00	±	1.12	-3	-2.27	±	0.98	-2	0.0001
	T4 - T0	-3.39	±	1.12	-3	-2.64	±	1.17	-3	0.0001
	T5 - T0	-3.97	±	1.49	-4	-3.09	±	1.33	-3	0.0001
Relative (%)	T1 - T0	-22.5	±	24.9	-25	-28.5	±	36.8	-33.3	0.10
	T2 - T0	-57.8	±	26.7	-50	-63.4	±	34.6	-66.7	0.25
	T3 - T0	-79.5	±	23.0	-75	-80.2	±	25.1	-100	0.84
	T4 - T0	-89.4	±	18.8	-100	-90.1	±	21.7	-100	0.86
	T5 - T0	-100.0	±	0.0	-100	-100.0	±	0.0	-100	NSA

Abbreviations: SD: standard deviation; NA: non-applicable. [1] Wilcoxon signed-rank test.

degree burns and might also exert therapeutic effects for conditions with disruptions of the epidermal barrier or inflammation. The topical replacement of three types of intracellular lipids in the corneal layer (free fatty acids, cholesterol, and ceramide) accelerates the regeneration of the epidermal barrier.[8] Lipid mixtures were efficient in allergic, contact, and atopic dermatitis.[13-14] Fatty acids increase innate immunity.[15] Oleic acid accelerates wound healing, regenerates the epidermal barrier, has bactericidal effects against methicillin-resistant Staphylococcus aureus (MRSA), and exerts anti-inflammatory actions.[16-18] In one study, oleic acid increased skin flap survival in rats.[19] Melaleuca alternifólia oil is an anti-inflammatory agent with powerful antibiotic action against bacteria (including MRSA), fungi, and viruses.[20-22] Crabwood (Carapa guianensis) oil accelerates wound healing in excision, incision, and dead space; exhibits powerful anti-inflammatory and anti-allergic actions; and might prevent histamine-induced hyperalgesia.[23-25] Vitamin A stimulates fibroblast proliferation and collagen production, is an antioxidant, provides protection against ultraviolent radiation, and has anticarcinogenic effects.[26-28] Tocopherol protects against DNA damage induced by ultraviolet radiation, reduces the inflammatory response, and is a powerful antioxidant.[28-30]

Epidermal integrity and homeostasis play an important role in skin wound healing and regeneration. Some evidence indicates that keratinocytes modulate the behavior of the dermal cells in the communication between the dermis and epidermis.[31] An emulsion containing a combination of such elements might quickly re-establish epidermal homeostasis, thus reducing inflammation and oxidative stress and, consequently, injury and pain.

Overall, the efficacy of COE was equivalent to that of desonide for pain relief and erythema improvement following superficial burns induced by IPL epilation, thus confirming the

results of the pilot study. The axilla subjected to previous preparation with COE for seven days exhibited less erythema and pain immediately after burn induction. These findings might indicate the protective effect of COE on the skin. The preparation regimen used in the present study is also applied in radio and chemotherapy protocols for patients with cancer, and its relevance was confirmed by the present study. ●

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Article
Original

Fractional ablative radiofrequency: a pilot study of twenty cases involving rejuvenation of the lower eyelid

Radiofrequência ablativa fracionada: um estudo-piloto com 20 casos para rejuvenescimento da pálpebra inferior

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ABSTRACT

Introduction: The skin is a marker of chronological age and appearance, being important for self-esteem and quality of life. Fractional ablative radiofrequency is one of the treatments aimed at delaying the effects of aging.

Objective: To describe the operating principles, methodology, and results of rejuvenation of the lower eyelids when treated with fractional ablative radiofrequency, and the resulting thermal damage observed on histology.

Methods: Twenty female patients with aging skin on the lower eyelids were selected for treatment with this method. In one of the patients, who concurrently underwent upper blepharoplasty, ablative fractional radiofrequency was carried out on the skin fragment to be removed from the upper eyelid for anatomical-pathological examination and measurement of thermal damage. The evaluation of clinical results was performed using photographic comparison and analysis of satisfaction questionnaires answered by patients.

Results: Photographic comparison showed significant skin retraction effects on the skin of the lower eyelids, while the analysis of questionnaires revealed a significant degree of patient satisfaction. Ten percent of patients experienced reversible local hyperpigmentation as a complication. Ablative and non-ablative damage was observed up to the superficial reticular dermis, with negligible thermal effects on the sides.

Conclusion: Fractional ablative radiofrequency was proven safe, effective, and cost-effective in skin rejuvenation, nevertheless further studies should be conducted with the aim of determining the optimal parameters, as well as the ideal number of sessions needed to achieve the best result with the lowest percentage of side effects.

Keywords: pulsed radiofrequency treatment; rejuvenation; skin aging; ablation techniques; laser coagulation; lasers.

RESUMO

Introdução: *A pele é um marcador da idade cronológica e da aparência, de grande importância para a autoestima e a qualidade de vida. A radiofrequência ablativa fracionada é um dos tratamentos que visam retardar os efeitos do envelhecimento.*

Objetivos: *Descrever princípios de funcionamento, metodologia e resultados do rejuvenescimento em pálpebras inferiores tratadas com radiofrequência ablativa fracionada e consequente dano termal observado na histopatologia.*

Métodos: *Foram selecionadas 20 pacientes do sexo feminino com envelhecimento da pele da pálpebra inferior para tratamento com o método. Em uma delas, submetida concomitantemente à blefaroplastia superior, foi realizada a radiofrequência ablativa fracionada no fragmento de pele a ser retirado da pálpebra superior para estudo anatomopatológico e mensuração do dano termal. A avaliação dos resultados clínicos foi realizada através de comparação fotográfica e análise de questionários de satisfação respondidos pelas pacientes.*

Resultados: *A comparação fotográfica mostrou efeito de retração cutânea importante na pele das pálpebras inferiores, e a análise dos questionários revelou grau de satisfação significativo. Dez por cento dos pacientes apresentaram como complicação hiperpigmentação local reversível. Notou-se dano ablativo e não ablativo até derme reticular superficial com efeito termal desprezível nas laterais.*

Conclusão: *A radiofrequência ablativa fracionada mostrou-se segura, eficaz e de baixo custo, porém, mais estudos devem ser realizados para determinar os melhores parâmetros, assim como o número de sessões para obtenção do melhor resultado com menor percentual de efeitos colaterais.*

Palavras-chave: *tratamento por radiofrequência pulsada; rejuvenescimento; envelhecimento da pele; técnicas de ablação; coagulação por laser; lasers.*

INTRODUCTION

Personal appearance is a human preoccupation dating back to ancient times, one that has led to the creation of numerous cosmetic practices.[1] The skin, being the most evident organ of the human body, becomes a marker of chronological age and appearance, and is an important factor in self-esteem and a good quality of life. Patients increasingly seek treatments aimed at delaying the effects of aging, whether they are related to advancing age or caused by environmental affects.[2]

The palpebral region is one of the first body sites to suffer such effects, not only because the local dermis is thin (the total thickness of skin varies between 400 and 800 microns), but also because it is a small cosmetic area, where the action of the muscles promotes resorption of the deep fat and favors the breakdown of the periorbital collagen fibers.[3] Rejuvenation of this area involves much more than just the improvement of the skin; local volumization, correction of muscle hypertrophy, and improvementof the tarsal support are also necessaryand can, in general, imply invasive techniques, such as blepharoplasty, botulinum toxin, and cutaneous filling.[3]

In order to be successful at rejuvenating this very important cosmetic area, an accurate examination of the eyelid and its supporting structure—which corresponds to the posterior lamella (septum, fat pads, and tarsal), and the anterior lamella (skin, subcutaneous tissue, and orbicularis muscle)—should be carried out.[4] One of the major concerns when using any technique for rejuvenating the skin of the lower eyelid is not to cause retraction of the anterior lamella to the extent that it causes ectropion as a complication. Thus, the skin depth reached during the technique and density are of great importance.[5] Other minor complications, such as hyperpigmentation, persistent erythema, and hypochromia, are also described. Chemical peels with trichloroacetic acid (TCA) and phenol (the formula described by Baker and Gordon) were the first techniques developed for the improvement of the skin of the lower eyelid.[6] The 50% TCA or phenol peeling produces coagulation of proteins up until the papillary or reticular dermis, and its penetration is often not predictable, as in laser technologies.[7] In most cases, complications are related to infection, focal hypopigmentation, postinflammatory hyperpigmentation, and persistent erythema, but not ectropion.[8] Over time, some ablative technologies, such as radiofrequency ablation and non-fractional CO_2 laser, have been widely used. These technologies have conferred greater precision to the treatment, reaching depths greater than 1mm, meaning thermal lesion of all the anterior lamella was achieved. However, they often cause ectropion.[9] Major drawbacks of these techniques were also the recovery time after the procedure (seven to ten days) and complications that, according to Alster, in a survey conducted in 2003 with 500 cases of non-fractional CO_2, amounted to 37%.[10] With the onset of fractional technologies, many of the above problems were solved.[11] Complications of hyperpigmentation and rare cases of ectropion decreased from 40% to 9%. The recovery time decreased, however there was often a need for more than one session to achieve similar results.[12] This is one of the factors that encouraged the authors to search for new therapeutic possibilities for facial rejuvenation, including ablative fractional radiofrequency (FARF).

The onset of high-frequency electrosurgery took place in 1978, when Maness et al.[13] defined the ideal alternating current frequency to cut and promote coagulation, i.e. an electric current that alternatesits polarity in 4,000,000 cycles/second. This frequency is in therange of FM radio, what gave rise to its being called 'radiofrequency'. High frequency alternating currents generate magnetic fields, which are released at the tip of the electrode that is attached to the device, in a way that the action of the system will take place through electromagnetic waves rather than through electrical current—which explains a very similar effect to that of the CO_2 laser. It is, therefore, a cutting and/or coagulation process depending on the type of current selected. If the current is slowed, it will have a coagulation effect; if it is purely sinusoidal, it will have a cutting effect; if it is a slowed sinusoidal current, it will both cut and promote coagulation. The intensity of the "brakes" exerted on the current (low blend or high blend) determines the intensity of the coagulation or thermal effect. The high frequency causes the positive and negative charges within the cell to oscillate, raising the temperature rapidly to 100ºC, causing its vaporization. The type of tip used determines the concentration of energy on a specific point; therefore, the smaller the area of contact (electrode's tip), the greater the ablation or evaporation power. There are three application models: Cut (20% coagulation and 80% cut), Low Blend (50% coagulation and 50% cut) and High Blend (80% coagulation and 20% cut).

Since Rox Anderson[14] discovered the advantages of the fractionation of some forms of light for skin rejuvenation, several other studies have been performed, and today there are different types of laser, radio frequency, and infrared devices that use this property as a way to render the treatments safer and more effective. As a result, the development of fractionating FARF began. The first successful attempts to use non-fractional ablative radiofrequency for rejuvenation were used for the resurfacing of the lower eyelid. However, such procedures are very dependent on the operator and in these first attemptslead to complications due to the excessive thermal effect.

Radiofrequency is radiation between 30KHz and 300MHz, within the electromagnetic spectrum that generates heat. This type of heat reaches the deeper tissues, creating energy and strong heat in the deeper layers of the skin, keeping the surface cool and protected, causing the contraction of existing collagen fibers and stimulating the formation of new fibers, making them more efficient in supporting the skin. The thermal effects of radiofrequency cause denaturation of collagen, promoting the immediate and effective contraction of its fibers, activating fibroblasts and leading to neocollagenesis, to the reorganization of collagen fibers and to the subsequent remodeling of the tissue. [15, 16] FARF is a new procedure that uses a random energy fractionation system that observes the tissue thermal relaxation time, similar to that which occurs with fractional CO_2 laser, however using a different energy source.[17, 18]

OBJECTIVES

To demonstrate, through the treatment of the lower eyelid with FARF, the tightening effect, i.e.the contraction of the tissue with improvement in the texture and in the appearance of the skin, and the rejuvenation entailed.

To demonstrate through an anatomical pathological study, the thermal effect of FARF on the skin that underwent this procedure, attempting to describe it quantitatively.

METHODS

A prospective study was carried out with 20 patients randomly selected from those who sought periorbital rejuvenation and presented with lower eyelid skin redundancy, at the Dermatology Ambulatory of the Faculdade de Medicina do ABC. FARF was indicated as the method to improve the lower eyelid skin. Cases of a protrusion of fat pads were treated with transconjunctival blepharoplasty in order for the skin to remain untouched. The included patients were female patients who had phototypes I - IV, with ages between 40 and 65 years. They patients were instructed to use SPF 50 sunscreen for at least 30 days before the procedure and suspend the use of topical retinoids a week before. The study was conducted according to the guidelines recommended by the Declaration of Helsinki 2000,which was updated in 2008. All patients signed a free and informed consent form for the procedure and a term authorizing that photographic records could be made. In one patient, who concomitantly underwent upper blepharoplasty, the authors took photographs of the skin to be removed with the same configuration used in the lower eyelid. The specimen was sent for histological study, carried out in vertical and horizontal sections stained with hematoxylin and eosin.

All procedures were performed under infiltrative local anesthesia with 30ml 0.9% saline solution associated with 10ml 2.0% lidocaine, 0.4 ml 1/10,000 epinephrine, and 1.0ml 8.4% sodium bicarbonate. The patients underwent a single session of fractional ablative radiofrequency with 3 passes in the lower eyelid, meaning that 80% of the region's skin was treated. The skin was humidified with sterile saline and gauze, carefully in order not to allow an excess of saline on the skin's surface (liquid film) thus avoiding possible burns in the site caused by the heating of this liquid film. The device, Wavetronic 5000 (Loktal Medical Electronics Industria e Comércio Ltda, São Paulo, SP, Brazil), was coupled with the megapulse system HF FRAXX (Loktal Medical Electronics Industria e Comércio Ltda.), which has an electronic circuit for fractioning energy. A pen with 64 microneedles 0.2mm thick and 0.8mm long, mounted on a teflon body, divided into eight columns of eight needles each, were in turn connected to the megapulse system. The laser parameters were then set as follows: 60% of power in the Wavetronic 5000's potentiometer (corresponding to 46watts) and on the 'Cut'option. The pen was always kept perpendicular and touching the damp skin. The overlap between one shot and another was 2mm, aiming at a fairly uniform application. When the applicator compresses the shooting pedal, the 64 needles are not energized at the same time, but in columns of eight needles, according to a preset sequence (in the present study's case, the sequence number 2 was used). That selection is made through the 'P' key (program), followed by the 'E' key (enter). The delivery of energy is randomized, i.e. it alternates between columns in a predetermined way, such that two adjacent columns are not energized sequentially, allowing cooling between shots and less thermal damage (Figure 1).

Through the ACTIVE key—which controls nothing more than the duration of the active current or the time during which the skin is exposed to heat—the megapulse system allows the selection of the duration of the current in milliseconds (ms), for each column formed by 8 needles. The possible range is 0 to 320ms (60ms was used in the present study). Moreover, the system also allows the variation of the resting time or thermal relaxation time of the eight columns through the DELAY key, which ranges between 60 and 320ms (60ms was used in the present study). Based on serial applications carried out earlier in pig skin, it was found that the optimal value for the ACTIVE and DELAY keys was of 60 ms in order for the thermal injury to resemble that of the fractional CO2 laser. The initial selection of those parameters was made considering an amount of energy sufficient (345mJ) for a safe treatment (Figure 2). Each of the pen's shots will cause 64 perforations in the skin (Figure 3). The post-treatment care was carried out using 5% dexpanthenol solution in the treatment site several times a day for five days, with the SPF 50 sunscreen being continued. [19]

The clinical results were evaluated through the comparison of the pictures taken before and 30 days after the procedure; the patients also answered a questionnaire regarding their satisfaction, which could be classified into three categories: very satisfied, satisfied, dissatisfied.

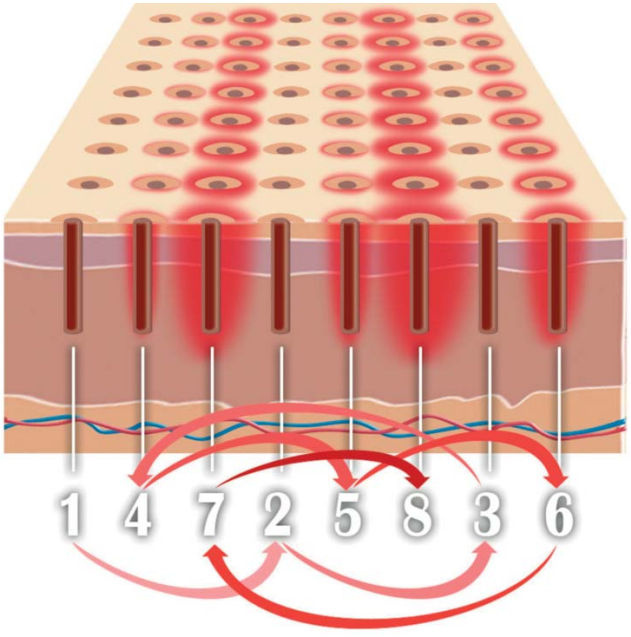

Figure 1: Fractionation of the shot (sequence of columns)

The histologic evaluation was carried out by measuring the thermal effect on the skin, in millimeters (mm).

RESULTS

Assessing the photographs taken before and after the procedure with a single session of fractional radiofrequency, it was possible to observe the contraction effect in the skin of the lower eyelid, with the consequent improvement in skin texture and reduction of local rhytids (Figures 4 and 5).

Of the 20 patients, 18 were very satisfied (90%) and only two (10%) indicated that they were only just satisfied with the results. Two (10%) had post-inflammatory hyperpigmentation in the treated area, which resolved after topical use of the combination hydroquinone/tretinoin for 15 days. In all cases, the crusts formed within two days after the procedure and took an average of 10 days to disappear. The erythema had a mean duration of 17 days, and the swelling lasted three days. Regarding the histologic study of the vertical sections, it was observed that the perforation of the needle in the epidermis, i.e. the ablative perforation, measured 0.1mm (100mμ), and the thermal effect on the dermis, or the destruction of the non-ablative effect was 0.1mm (100mμ) deep, with negligible lateral thermal effect (Figure 6). In the horizontal section, a thermal effect could be observed in the dermis underlying the needle's perforation and the 1mm spacing between the needles, with total preservation of tissue between the perforations (Figure 7).

DISCUSSION

FARF constitutes a further possibility for the treatment of aging skin. It is a procedure that emits waves that reach the deeper layers of the skin, generating energy and strong heat over them, nevertheless keeping the surface cool and protected. It was possible to observe that the procedure can achieve the depth of 100 microns, i.e. it reaches the papillary dermis, where it causes ablation and coagulation of surrounding proteins due to the residual thermal damage. This leads to both the contraction of existing collagen fibers and stimulates the formation of new fibers, making them more efficient in supporting the skin. The present study's result shows that this procedure can be considered a useful treatment for periorbital rejuvenation, a fact that has motivated several ongoing studies in an attempt to demonstrate these effects not only on the eyelids, but across the face, acne scars, unaesthetic scars, and recent and old atrophic striae.

Figure 2: Selection of the current duration of each column (60ms), and of the relaxation time between the columns (60ms).

Figure 3: Aspect of the perforations seen through stereomicroscopy

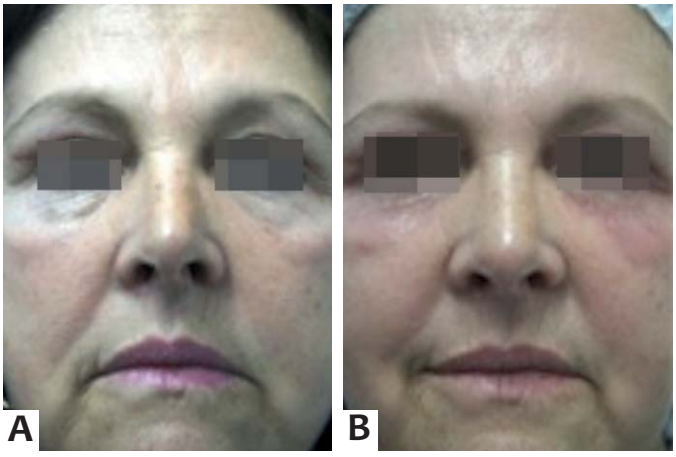

Figure 4: A: Pre-treatment photograph—note the sagging and rhytids in the lower eyelids. **B:** Photograph at 30 days after the FARF session showing improved texture and sagging of the skin and attenuation of rhytids

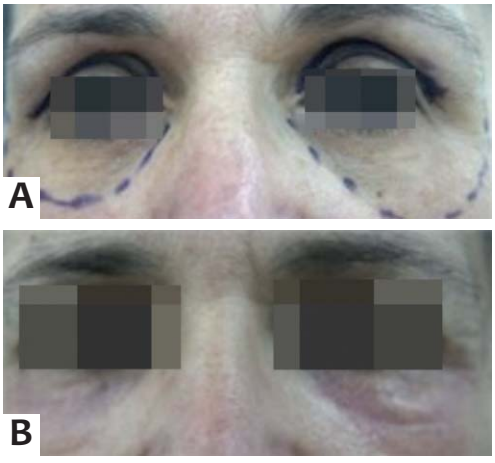

Figure 5: A: Pre-treatment photograph—note the sagging and rhytids in the lower eyelids. **B:** Photograph at 30 days after the FARF session showing improved texture and sagging of the skin and attenuation of rhytids

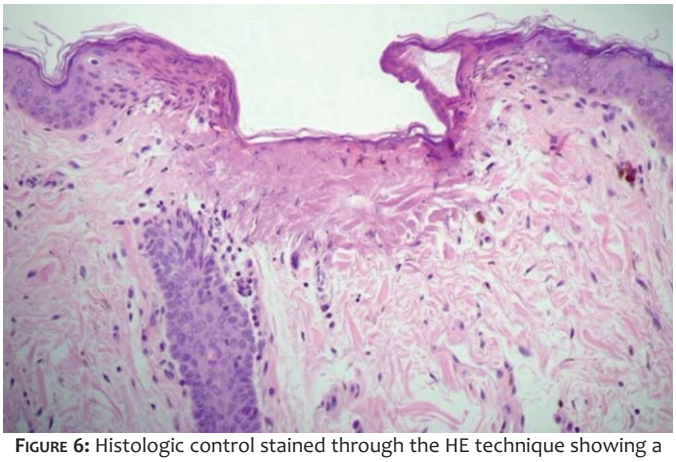

Figure 6: Histologic control stained through the HE technique showing a 0.1 mm ablative effect on the epidermis and a 0.1mm non-ablative effect on the dermis, with minimal side effects

Figure 7: Horizontal section showing non-ablative thermal effect in the needle's base measuring 200mμ, corresponding to the needle's diameter, with minimal lateral thermal effect.

The side effects were easily resolved with expectant conduct, adequate hydration, sun protection, and topical post-operative whitening therapy. [20] This technique has allowed a considerably interesting rejuvenation effect at low cost and with low complication rates. Due to the fact that the device has no consumables and does not necessarily need coolers and even a light source, it is more affordable and easier to maintain as compared to laser devices, offering very similar results. [21, 22] The treatment of periocular aging skin is challenging, and new technologies have been emerging for a long time, most of them with poor results. CO_2 laser has been standing out recently due to both the cosmetic results and the low incidence of post-operative side effects, as well as for the quick recovery time. However, it is an expensive treatment, which limits its use. [23-27]

Some of the limitations of the present study reside in the fact that only one radiofrequency session was carried out, which may affect the actual final result. There are ongoing studies showing significant clinical results with the number of sessions ranging from 3 to 5. We cannot say, therefore, that the results obtained in the present study were the best possible. Furthermore there is no consensus yet about the ideal number of passes nor the minimum or maximum number of sessions needed for a result that could be considered excellent.

There is still much to be studied regarding this new therapeutic resource, such as the analysis of the treated area in the long run with anatomical pathology, definition of standards for the energy applied, new therapeutic possibilities, and even comparisons with the parameters used in CO_2 laser, for the same scope.

CONCLUSION

As in other already published studies, FARF proved to be safe, efficacious, and cost-effective in the present study, and among the tools available in the periorbital rejuvenation armamentarium. [6] Further studies should be carried out in order to determine the best parameters and optimal number of sessions to achieve the best result with the lowest rate of side effects. ●

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Article
Original

The use of nail abrasion as an auxiliary method to obtain samples for the diagnosis of onychomycosis

O uso da onicoabrasão como método de auxílio na obtenção de amostras para o diagnóstico da onicomicose

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ABSTRACT

Introduction: Onychomycosis is a fungal nail infection, corresponding to about 50% of onychopathies. The most frequently used tests for diagnosis are direct microscopy and fungal culture. The collection of samples is the most critical stage in the diagnosis of onychomycosis. Due to lack of knowledge or technical difficulty, samples are collected from the most distal part of the nail, where the fungal viability is low.

Objective: To evaluate the use of nail abrasion as an auxiliary method to collect material for the diagnosis of onychomycosis, comparing it with results obtained using the traditional collection method.

Methods: Thirty patients with clinical suspicion of onychomycosis in the feet had samples of their finger nails collected for examination using two different methods. The collection was initially made with the traditional method (distal part of the nail). Subsequently, nail abrasion was performed in the most proximal portion of the lesion, with the collection of scales from the abraded area. Both samples underwent mycological examination and culture.

Results: The samples collected following nail abrasion showed a higher percentage of positive results than those collected from the distal portion, with positivity rates of 76.7% and 36.7%, respectively ($p = 0.0018$).

Conclusions: Nail abrasion is an effective auxiliary method in the diagnosis of onychomycosis, having been proved superior to the traditional collection technique.

Keywords: nails; onychomycosis; onychomycosis/diagnosis; diagnosis.

RESUMO

Introdução: *A onicomicose é infecção fúngica das unhas, correspondendo a cerca de 50% das onicopatias. Os exames mais utilizados para diagnóstico são a microscopia direta e a cultura fúngica. A coleta das amostras é a fase mais crítica de seu diagnóstico. Normalmente, por desconhecimento ou dificuldade técnica, as amostras são coletadas da parte mais distal da unha, em que a viabilidade fúngica é baixa.*

Objetivo: *Avaliar o uso da onicoabrasão como método auxiliar na coleta de material para o diagnóstico de onicomicose, comparando com os resultados obtidos por meio da coleta tradicional.*

Métodos: *Trinta pacientes com suspeita clínica de onicomicose nos pés tiveram amostras da unha coletadas de duas formas diferentes para exame. Inicialmente, a coleta foi feita da forma tradicional (parte distal da unha). Em seguida, realizou-se a onicoabrasão da parte mais proximal da lesão e coleta das escamas dessa área abrasada. Ambas as amostras foram submetidas a exame micológico direto e culturas.*

Resultados: *As amostras colhidas após a onicoabrasão apresentaram porcentagem de resultados positivos superior às amostras coletadas da porção distal, com positividade variando de 76,7% a 36,7%, respectivamente ($p = 0,0018$).*

Conclusões: *A onicoabrasão é método auxiliar eficaz no diagnóstico da onicomicose, mostrando-se superior à técnica tradicional de coleta.*

Palavras-chave: *unhas; onicomicose; onicomicose/diagnóstico; diagnóstico.*

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INTRODUCTION

Onychomycosis is a fungal infection that affects the nails, accounting for about 50% of all onychopathies. [1-4] It is estimated that the prevalence ranges from 2-13% in the general population, reaching 48% among those over 70 years old.[5] Approximately 20% of the U.S. population, aged between 40 and 60 years, has onychomycosis.[1]

A recent Brazilian study showed a higher prevalence of onychomycosis in females in the age group above 46 years and in people who practice sports. The nails of the halluces were the most affected, and *Trichophyton rubrum* was the most frequently isolated fungus.[6]

In most cases there is involvement of the nails of the feet, probably due to the fact that the growth rate of these nails is 50-60% slower than those of the hands, facilitating infection. Studies show that the proportion of involvement of the fingernails and toenails was 1:4 in Spain and 1:19 in Canada.[2]

Onychomycosis can be caused by three different fungi types: dermatophytes, yeasts and non-dermatophytes. Dermatophytes are keratinophilic fungi and are considered the most common agents, being responsible for about 90% of cases. In this group, the *Trichophyton rubrum*, followed by the *Trichophyton mentagrophytes* stand out as the most frequent species. [2,7-9]

Onychomycosis caused by yeast is rare and, in most cases, is present in the nail only as a colonizing fungus. It usually affects patients with several comorbidities or with some degree of immunosuppression and most often affects the fingernails.[2,6] According to the literature data, yeasts are involved in 5-17% of cases of onychomycosis, the most common being *Candida albicans*.[2,7,9] Studies show a high prevalence of the *Candida* species in northeastern Brazil.[10-12]

The non-dermatophyte fungi are agents that are rarely involved. Some articles have questioned the real pathogenicity of these fungi in the nail [4, 12,13] and support the idea that, in most cases where these fungi are isolated, they are not the real causal agent, but rather the contaminant agents. Thus, the diagnosis of onychomycosis caused by non-dermatophytes is difficult, since they are common contaminants of nails and in mycology laboratories. The most frequently isolated species is the *Scopulariopsis brevicaulis*. [2,4]

Lately, an increase in reports of cases of onychomycosis caused by non-dermatophyte fungi has been observed, mainly in Europe, with prevalence rates ranging from 1.6-6%.[5] Onychomycosis can be classified into four types, depending on their clinical presentation, i.e. the type of involvement of the nail plate. [1,6,7,14]

The distal and lateral subungual onychomycosis (DLSO) is the most common form. The fungus invades the nail through the hyponychium and grows slowly and proximally. Hyperkeratosis of the nail plate and onycholysis can be observed, making it opaque. The white superficial onychomycosis (WSO) mainly affects the toenails and the main agent is the *Trichophyton mentagrophytes*. Hyphae parasitize the most superficial portion of the nail plate, causing a white, opaque, brittle fingernail appearance. In proximal subungual onychomycosis (PSO), the fungus invades the proximal portion of the nail through the proximal nail fold, forming a whitish area in the lunula region and progresses distally.

The total dystrophic onychomycosis (TO) is the clinical form that corresponds to the advanced stage of the disease. There is destruction of the plate, leaving only keratin debris and a thickening of the nail bed.

In a recent study, Hay and Baran proposed a new classification for onychomycosis, including the clinical forms already mentioned, the "endonyx" onychomycosis, the mixed pattern onychomycosis and the secondary onychomycosis.[15] The "endonyx" onychomycosis is characterized by the invasion of the nail plate without involvement of the nail bed. It presents lamellar separation of the nail plate with discoloration, and absence of inflammation of the nail bed or subungual hyperkeratosis. The mixed pattern comprises cases that show the combination of different patterns of infection in the same nail, while the secondary onychomycosis corresponds to fungal infection of the nail and surrounding tissues secondary to other conditions such as psoriasis and trauma.

The difficulty in establishing a clinical diagnosis of onychomycosis, coupled with the fact that the treatment of this condition often requires the use of systemic antifungal agents for long periods, causing potential side effects, justifies the need to establish the correct diagnosis, with the isolation of the causative agent. [3,4]

There are several methods used in the diagnosis of onychomycosis: direct microscopy, fungal culture, histological examination of the nail plate stained by PAS, immunohistochemistry, plate dermoscopy, confocal microscopy, flow cytometry, scanning electron microscopy and polymerase chain reaction (PCR). [3,4,12,16,17]

Currently, the most widely used diagnostic tests are direct microscopy with potassium hydroxide and cultures [3,16] These methods, however, require time and may present technical difficulties, even when performed by experienced professionals.[16]

The sample collection is the most critical phase in the diagnosis of onychomycosis. In general, samples should be collected in the most proximal part of the affected nail,[12] but usually due to ignorance or technical difficulties, the collection of the most distal part of the nail is carried out, where the fungal viability is low.[13] In direct mycological examination, the scales are bleached with 20-30% potassium hydroxide (KOH), which also acts by dissociating hyphae from the keratinocytes. The sensitivity of this test can be improved when using 40% DMSO (dimethyl sulfoxide). Stains such as Parker blue-black, and chlorazol Black E and calcofluor can also improve the visualization, staining the hyphae with various colors.[1,4,12]

In a direct mycological examination it is possible to visualize fungal elements, such as septate and hyaline hyphae or pseudohyphae, however it is not possible to establish the species and fungal viability. [4,12]

A culture is needed to identify the etiologic agent. The collected material must be seeded in at least two culture media, the most common is Sabouraud agar. [1,7] The culture media may also contain antibiotics (chloramphenicol) and cycloheximide in order to inhibit the growth of contaminating bacteria and fungi, respectively. [12,18] The accuracy of both the mycological exam and the culture ranges from 50-70%, depending on the technique of collection and sample preparation.[12] Due to the variable sensitivity of these methods, other diagnostic tests are being used.

Histological examination of the nail can be considered a supplementary test in cases where the direct mycological exam and the culture were not able to confirm the diagnosis, but a clinical suspicion remains. In this examination, the fragment of the nail is stained with PAS (Periodic Acid-Schiff), allowing visualization of fungal structures, as well as the extent of the infection.[3,12]

In recent studies, Borkowski et al. as well as Lawry et al. compared the efficacy of various methods for the diagnosis of onychomycosis.[4] Both studies concluded that the histopathologic examination with PAS was more effective than the direct mycological examination and the culture. However, the histopathological examination has the disadvantage of being unable to establish the identity of the causative agent and does not provide information on the pathogen's viability.

More advanced diagnostic techniques such as immunohistochemistry, flow cytometry, confocal microscopy and PCR have been used successfully in the diagnosis of onychomycosis. However, large-scale implementation of these methods is very unlikely due to the need of cutting edge technology and high cost.

Thus, in daily clinical practice, especially regarding the sampling process, resources capable of increasing the accuracy of the mycological examination and culture are used. Onychoabrasion consists of sanding the nail plate using an electrical device and sandpaper of varying roughness.[14] Abrasion is an old surgical technique in dermatology, first used in 1905 for the treatment of depressed scars.[19] Over the years it has improved and had its indications expanded, including its use in the nail plate. Unlike the usual sample collection, which has limitations such as patient discomfort and difficulty in obtaining enough samples from the more proximal part of the lesion, this method helps in collecting scales, reducing those limitations.[14,20]

The present study was aimed at evaluating the use of onychoabrasion as an auxiliary method for the collection of material for the diagnosis of onychomycosis, and comparing results with those obtained using the traditional method.

METHODS

A prospective study was carried out with 30 patientsfrom the Dermatology Ambulatory of the Hospital do Servidor Público Municipal de São Paulo, S.P., Brazil, who voluntarily sought care between the years of 2011 and 2012.

The study was approved by the Research Ethics Committee of the institution (Authorization No. 35/2011; Protocol 237/2011).

Patient selection

Thirty patients of both genders were selected, according to the following inclusion criteria: clinical suspicion of onychomycosis affecting any nail of the feet, with the following clinical forms: lateral and distal subungual onychomycosis, or total dystrophic onychomycosis. Absence of systemic or topical antifungal treatment within the previous six months. Agreement to participate in the study by signing the free and informed consent form. To be over 18 years old.

Sample collection

The patients selected were referred for the collection of material. Samples intended for diagnostic tests were collected in two ways. First, the affected nail was scraped on the free border according to the usual method, with a scalpel or curette.

Subsequently, the more proximal area of the lesion was identified in the same nail, and was then subjected to the onychoabrasion with the electric device Dremel-MultiPro® model 395, coupled to a disposable rotary sanding paper (Figure 1). The collection was then carried out in the abraded area (Figures 2 and 3). Before both samplings, the nail was cleansed with 70% alcohol. Each sample, regardless of the collection technique (distal or abrasion), was separated into two parts—one destined for the mycological examination and the other to the culture.

For the direct mycological examination, the samples were prepared with 20% potassium hydroxide, associated with 40% dimethyl sulfoxide, and then visualized under optical microscopy with 10-40x magnification.

Two culture media were used for the seeding of each material. The Sabouraud agar with chloramphenicol is a rich medium that allows the growth of dermatophytes, non-der-

Figure 1: Device used in the onychoabrasion (Dremel-MultiPro®, model 395).

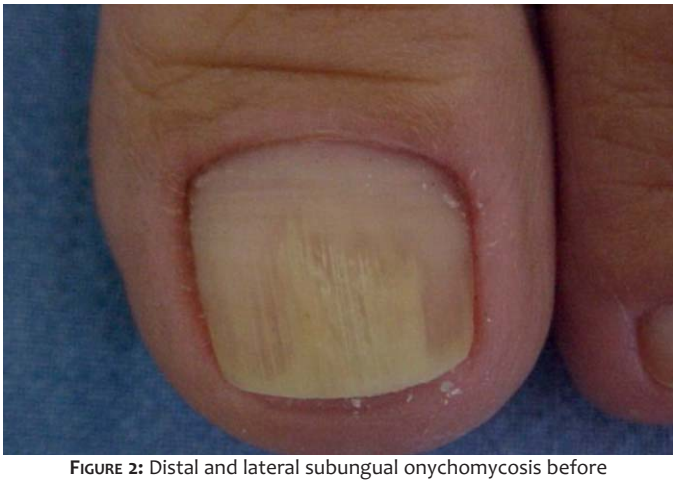


Figure 2: Distal and lateral subungual onychomycosis before onychoabrasion

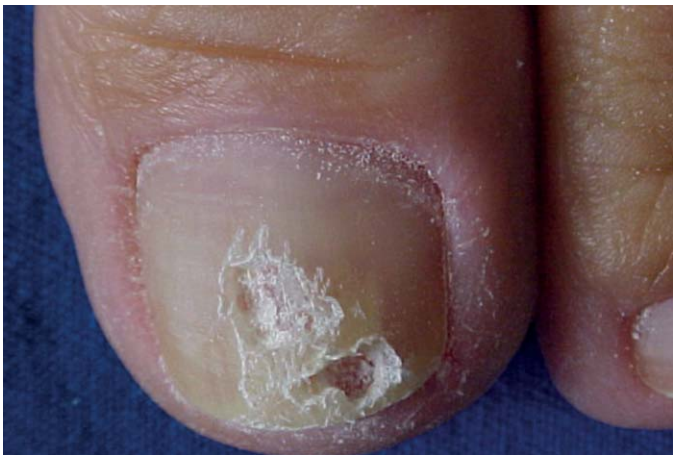


Figure 3: After onychoabrasion of the more proximal portion of the lesion

matophytes, and yeasts. The second medium used was the Sabouraud agar with chloramphenicol and cycloheximide (Mycosel), which is more selective, inhibiting the growth of yeast and non-dermatophyte fungi.

Statistical analysis

The result of the direct mycological examination provided three options: positive (when septate hyaline hyphae were visualized), and negative (in the absence of fungal structures). The third possibility corresponded to cases where such an examination could not be performed due to insufficient material.

Culture results were analyzed separately for Sabouraud agar and Mycosel. There were four possible results: positive, absence of growth, insufficient material, and contamination.

Positivity was achieved with the growth of dermatophyte fungi in the culture medium. In the absence of growth of any microorganism, the result was considered as *absence of growth*.

In cases where the material was insufficient, the culture could not be performed.

The growth in the bacteria culture medium, yeast and non-dermatophyte fungi, was deemed as a contamination. For performing certain calculations, the result of the culture result was classified into two major groups: those with positive results (corresponding to the cases where there was growth of dermatophytes), and those with negative results, which comprised the cases of absence of growth, insufficient material and contamination. For the data analysis, the McNemar test was used, assuming an alpha = 0.05. Results were considered significant if the calculated "p" was less than alpha = 0.05.

RESULTS

The collection of material from the distal part of the nail—the first step—provided positive direct mycological examination in 20 patients. In 10 cases, the examination could not be performed due to insufficient material (Table 1).

On the other hand, the sampling performed after onychoabrasion resulted in a positive direct mycological examination in 100% of cases (30 patients); there were no cases of insufficiency of material for analysis.

The culture in Sabouraud agar of the samples collected from the distal region of the nail showed contamination in 13 cases (43.33%), growth of dermatophyte fungi in 3 cases (10%), absence of growth in 4 (13.33%), and in 10 patients (33.33%) the culture was not performed due to insufficient material. The samples collected after the onychoabrasion and cultured in the same agar, showed contamination in 23 cases (76.67%), growth of dermatophytes in 6 cases (20%) and absence of growth in 1 case (3.33%).

The Mycosel agar culture of the samples collected from the distal region of the nail showed contamination in 1 case (3.33%), growth of dermatophytes in 11 (36.67%), absence of growth in 8 (26.67%), and in 10 patients (33.33%) culture was not carried out due to insufficient material. The samples collected after the onychoabrasion presented contamination in one case (3.33%), growth of dermatophytes in 23 (76.67%) and absence of growth in 6 (20.00%). (Table 2 and Graph 1)

In these 23 cases where the results of the Mycosel culture was positive, *Trichophyton rubrum* was isolated in 21 patients, while *Trichophyton mentagrophytes* was found in only 2 cases. (Graph 2)

The results of the culture were then separated into two large groups. One with positive results, which corresponded to cases where there had been growth of dermatophyte fungi, and another with negative results, which comprised cases of contamination, absence of growth, and insufficient material.

The results (positive and negative) of the agar culture with Mycosel of the distal collectionwere compared with the analogous culture, however with collection after onychoabrasion. The McNemar test was applied and revealed that the difference between the proportions in the results identified by the two methods were statistically significant (p = 0.0018). (Table 3)

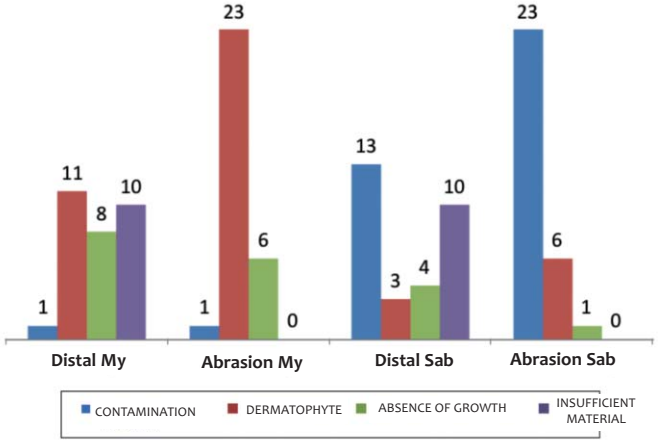
On the other hand, when performing the same comparison with Sabouraud culture, it was verified that the differences

Table 1: Comparison of number of patients who had insufficient material for the diagnostic tests, according to the sampling site: distal or after onychoabrasion (Abrasion)

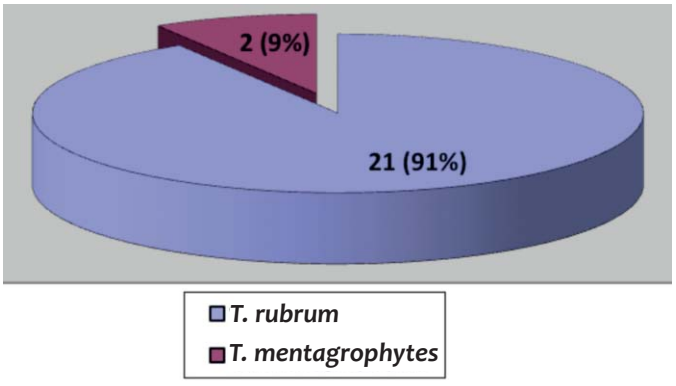
Distal	Abrasion	YES	NO	TOTAL	%
	YES	0	10	10	33.3
	NO	0	20	20	66.7
	TOTAL	0	30	30	
	%	0.0	100.0		
Difference	95% CI	33.33			
Chi-square	12,7; 33.33%				
Significance level	P= 0,002				

Table 2: Descriptive results (absolute numbers and percentage) of cultures in Sabouraud (Sab) and Mycosel (My) media, according to the sample collectiontechnique: distal or after onychoabrasion (Abrasion)

Method	Results	Distal My		Distal Sab		Abrasion My		Abrasion Sab	
	N°	%		N°	%	N°	%	N°	%
Contamination	1	3.33		13	43.33	1	3.33	23	76.67
Dermatophyte	11	36.67		3	10.00	23	76.67	6	20.00
Absence of growth	8	26.67		4	13.33	6	20.00	1	3.33
Insufficient material	10	33.33		10	33.33	0	0.00	0	0.00
Total	**30**	**100.00**		**30**	**100.00**	**30**	**100.00**	**30**	**100.00**



Graph 1: Results in absolute numbers of the cultures in Sabouraud (Sab) and Mycosel (My) media, according to the sampling method: distal or after onychoabrasion (abrasion)



Graph 2: Species of dermatophyte fungus isolated in Mycosel culture of samples collected from onychoabrasion

in results (positive and negative) between the distal collection and that carried out after onychoabrasion were not statistically significant (p = 0.25). (Table 4)

DISCUSSION

The study reveals a greater amount of positive results in samples collected after the onychoabrasion than that of the samples taken from the distal portion of the nail, with positivity

Table 3: Comparison between results of cultures in Mycosel medium from samples collected from the nail's distal part (Distal MY) and samples collected after onychoabrasion (Abrasion MY)

	Abrasão MY			
Distal MY	**Teste Positivo**	**Negative test**	**Total**	**%**
Positive test	**10**	**1**	**11**	**36,7**
Negative test	13	6	19	63.3
Total	23	7	30	100.0
%	76.7	23.3	100.0	
Difference	40.00%			
95% CI	15.06% to 46.5%			
Exact probability	P = 0.0018			

Table 4: Comparison between results of cultures in Sabouraud medium of samples collected from nail's distal part (Distal Sabouraud) and samples collected after onychoabrasion (Abrasion Sab)

	Distal Sabouraud			
Distal Sabouraud				
	Positive test	**Negative test**	**Total**	**%**
Positive test	3	0	3	10
Negative test	3	24	27	90
Total	6	24	30	100.0
%	20	80	100.0	
Difference	10.00%			
95% CI	-4.15% to 10%			
Exact probability	P = 0.2500			

ranging from 76.7% to 36.7% onychoabrasion. This difference was statistically significant (p = 0.0018).

The confidence interval of the difference shows that the onychoabrasion out performed the distal collection by 68% in the identification of fungi in Mycoselculture.

Despite the fact that 100% of the samples (excluding cases of insufficient material), both proximal and distal (onychoabrasion) have yielded positive direct mycological examination, the Mycosel culture medium had growth of dermatophyte fungi in only 66.7% of distal samples and 76.7% of the samples collected after the abrasion.

Most likely, this finding is due to the fact that the fungi found in direct mycological exams do not present viability in culture. The superiority of positive results in the culture of samples collected after onychoabrasion suggests that the sanding of the most proximal part of the lesion favors the collection of fungi with greater viability.

A study by Shemer et al. evaluated 194 patients with clinical suspicion of onychomycosis.[13] The samples were collected from three different locations of the nail: proximal, middle, and distal parts. These samples were obtained both by traditional curettage and by the drilling of the nail with an electric device. Regardless of collection technique, the results showed that the sensitivity of the culture increased as the location of the collection became increasingly more proximal, agreeing with the finding of the present study.

Furthermore, the technique of drilling resulted in cultures with higher sensitivity in the three sampling sites, probably due to the fact that it provided better quality and a greater quantity of material. The onychoabrasion would also have the function of providing better samples for examination.

In the present study, *Trichophyton rubrum* (TR) was the most frequently isolated fungus, regardless of the collection site. In the samples originated from the onychoabrasion, TR was isolated in 91% of cases, followed by *Trichophyton mentagrophytes*, found in 9% of patients. In the collections in the distal part, TR

was isolated in 100% of cases. This information is consistent with the data presented in the international literature, highlighting *Trichophyton rubrum* as the main agent of onychomycosis.

The comparison of the results of the Sabouraud medium showed no statistically significant differences between the samples of the distal part and those from after onychoabrasion, as observed in a Mycosel medium. The contamination corresponded to 76.67% of the onychoabrasion cultures and to 43.34% of the distal partcultures.

In contrast, dermatophytes fungi were isolated in only 20% of the onychoabrasion cultures and in 10% of the distal part cultures.

These findings are probably due to the fact that the Sabouraud culture medium is rich and non-selective, favoring the growth of microorganisms in a minimally restricted way.

Yeasts, dermatophyte, and non-dermatophyte fungi find a medium conducive to their development, hindering the identification of the pathogen and the contaminant. The bacteria generally have their growth inhibited by the presence of antibiotics, such as chloramphenicol, in most of the culture media.

On the other hand, the culture medium Mycosel is more selective due to the presence of cyclohexemide, a substance cable of partially or totally inhibiting the growth of yeast and non-dermatophyte fungi.

One of the already mentioned limitations of the direct mycological examination of samples collected in the usual manner (distal) is running into only scarce material for the exam. In 10 of the 30 patients selected for the study, there was insufficient material in the distal partcollection.

With the abrasion of the nail, in all 30 cases it was possible to obtain material for the direct mycological examination and culture. Thus, onychoabrasion emerges as an important resource for collecting material, therefore reducing the technical limitations of the usual collection method.

CONCLUSIONS

The study proves that onychoabrasion is an effective auxiliary method in the diagnosis of onychomycosis, for it provides better quality samples for analysis, making it superior to the traditional technique in identifying the fungus in both direct mycological examination and culture.

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"Facial squaring" in the aging process

"Quadralização facial" no processo do envelhecimento

Review article

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ABSTRACT

Structural alterations resulting from the aging process of the face are related to muscular action, skin sagging, loss of bone support, and decrease in the volume of facial fat compartments—all inducing alterations in facial contour over the years. The authors have carried out a review of the main causes linked to the so-called facial contour alteration in aging and defined a new denomination for this process: "facial squaring", the process through which the shape of the face—which is that of an inverted trapezoid in youth—becomes that of a square over time.

Keywords: rejuvenation; skin; facial muscles.

RESUMO

As mudanças estruturais decorrentes do processo de envelhecimento da face estão relacionadas com ação muscular, flacidez da pele, perda da sustentação óssea e diminuição do volume dos compartimentos de gordura faciais, que, com o passar dos anos, geram alterações em seu contorno.

Faz-se uma revisão das principais causas relacionadas às assim chamadas mudanças do contorno no envelhecimento facial e define-se nova denominação – a "quadralização facial" – para esse processo, que faz com que a forma da face se transforme com o passar do tempo, de um trapézio invertido, na juventude, em um quadrado.

Palavras-chave: *rejuvenescimento; pele; músculos faciais.*

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INTRODUCTION

The perception of beauty is an experience or process based in the way that certain physical elements appeal uniquely to the individual beholder. Some believe that there is a strong connection between beauty and mathematics, as evenly proportioned, symmetrical faces with rounded contours, high cheekbones, and clearly-defined eyebrows appear to be more attractive. Alterations in the proportions of facial structures take place with the aging process, leading many individuals to seek aesthetic treatments aimed at reversing or maintaining their appearance from youth.

This beauty standard was set in ancient times in Egypt, and was based on records of Queen Nefertiti's facial appearance, which is perhaps the most beautiful facial image that the world has ever known. Her name was probably pronounced as "Naftaiyta" meaning "beauty has arrived." Her fame has overcome the barriers of time. Her perfectly symmetrical face, gen-

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tly curved eyebrows, almond-colored and carefully defined eyes, prominent zygomatic bones, thin and proportional nose, full lips, absence of wrinkles or expression marks, and thin, elongated neck established an ideal of beauty that is pursued to the present day.[1]

The literature describes how, during youth, the human face is shaped like an inverted triangle, with the apex pointing downwards, translating into a well-defined facial middle third. Through the aging process, changes infacial structure leadto a loss of contours and volume, with the inversion of the triangle seen in youth. Other facial shapes can be described as oval, round, heart-shaped, and square, among others.

Not long ago, with the discovery of the facial fat compartments [2,3] and the introduction of higher viscosity hyaluronic acid in the treatment of volume replacement and improvement of facial contours, the approach to the treatment of facial aging with the use of cutaneous fillers saw the onset of a new age. This new approach focuses on the face as a whole, attributing importance to the maintenance of its three-dimensionality and not onlyto the treatment of wrinkles and furrows, which are often the result of a decrease in the volume of facial fat and bone resorption resulting from aging.

The authors call the changes in facial contours resulting from aging "quadralization" of the face: while in youth the face is shaped like an inverted trapezoid, it tends to become a square over time. (Figure 1)

Seeking a better understanding of the reasons related to facial "quadralization", the aging process will be approached in the present article based on four main pillars: sagging skin, muscle depressant action, volumetric decrease in fat compartments, and loss of the deep support due to bone remodeling.

EFFECTS OF AGING

A very common practice consists of dividing the face horizontally into thirds, in order to assess its symmetry and balance. The upper third runs from the hairline to the glabella, the middle third runs from the glabella to the subnasal region, and the lower third runs from the subnasal region to the mentum.[4] (Figure 2)

Different types of alterations occur in the face during the aging process. In the upper third, these alterations are related to chronic damage caused by ultraviolet light, to the intrinsic muscles of facial expression and its influences on the skin, and to gravitational changes linked to loss of tissue elasticity.[5-7] In the middle third, they result from a combination of photoaging, loss of subcutaneous tissue, loss of skin elasticity and remodeling of bone and cartilaginous structures. The orbital septum can weaken over time, allowing protrusions of fat in the upper or lower eyelid. However, some people may experience loss of subcutaneous tissue in the eyelid, which causes a sunken appearance. The malar region can be affected by the loss of buccal fat volume, which is located between the masseter muscle (anteriorly) and the buccinator muscle (posteriorly). The support mechanisms of the nasal tip can become inelastic and stretch with age, resulting in the ptosis of the nasal tip and an apparent lengthening of the middle third of the face.[5-9] In the lower third, the alterations result from the combination of chronic damage by ultraviolet light, loss of subcutaneous fat, changes linked to the muscles of facial expression and neck, gravitational changes due to loss of tissue elasticity and remodeling of the bone and cartilaginous structures. The structure of dentition and the resorption of the maxillary and mandibular bones can result in a widespread loss of size and volume. The chin rotates anteriorly and becomes thinner and more protruded. In addition to an intrinsic decrease in the volume of the lips, the tip of the nose's ptosis can also contribute to the appearance of a reduced upper lip.[5-8]

In this manner, the present study will cover the four main aesthetic pillars related to these alterations in order to achieve a better understanding of the aging process and of the of indication of treatment techniques for the recovery or maintenance of facial contours.

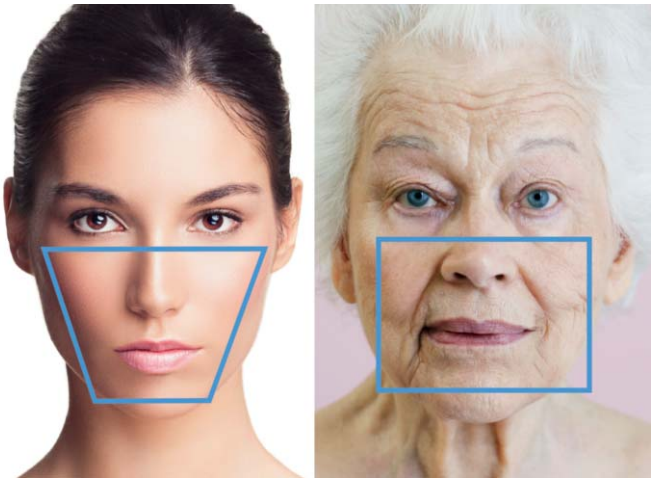

Figure 1: Facial quadralization resulting from aging

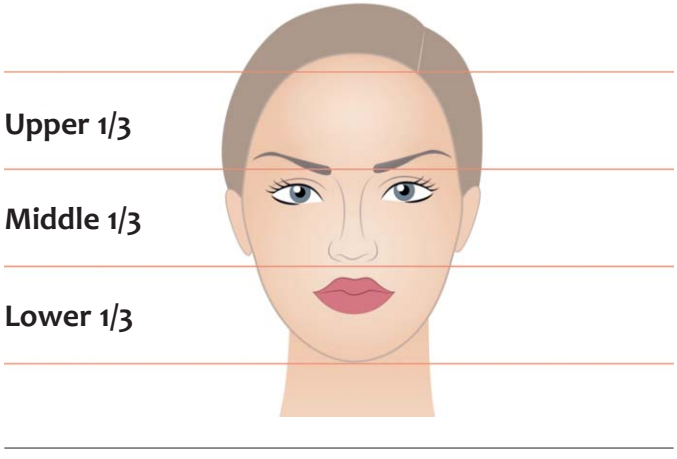

Figure 2: Division of the facial thirds

Table 1: Superficial fat compartments of the middle third of the face. The nasolabial fat, the superficial medial cheek fat, and the infraorbital fat are parts of the malar fat

MIDDLE THIRD OF THE FACE'S SUPERFICIAL FAT COMPARTMENTS	
Nasolabial fat	NLF
Superficial medial cheek fat	SMCF
medium cheek fat	MALAR FAT
Lateral temporal cheek fat	
Infraorbital fat	IOF

1. *Sagging Skin*

The skin's tension lines are the result of multiple interactions of extrinsic and intrinsic factors. Intrinsic factors are independent of one's will, reflecting genetic inheritance. They consist of inherent properties of extensibility, elasticity, and tension that are associated with the skin's biostructural components. These structural elements consist of dermal collagen and elastic tissues. With age, collagen begins to increase cross-linking, having reduced its volume and elasticity. The elastic fibers are more abundant in the facial dermis than in the scalp, and therefore are responsible for maintaining the skin's static tensionby restoring deformed collagen to its original state. With age, and especially with prolonged exposure to the sun, the elastic fibers are subject to structural and functional deterioration, gradually losing the ability to return to its original length, which results in the loss of skin firmness.[9]

Extrinsic aging is primarily caused by the exposure to the sun, but also by smoking, excessive alcohol consumption, and poor diet, among other factors.[3] In addition to extrinsic factors, the muscles of facial expression insert directly into the skin, exerting continuous tension even at rest. Over time they causethe stretching of the collagen in the direction that the muscles move.

In childhood, the elastic tissue remains in its configuration, and those changes are not very apparent. With age, the skin loses elasticity, and elongation begins to be noticed, with redundant skin being directed to wrinkles and rhytids. Linear wrinkles result from the union of multiple fibers of the superficial musculoaponeurotic system (SMAS) with the dermis, stretching the skin and reducing its tension in the direction of the facial muscles' movement. The tension lines of the skin are perpendicular to the sum of the force vectors of the muscles' movement. The decrease in tension, the increase in the elongation of collagen fibers and the progressive reduction of the elastic tissue produce such lines, which exacerbate gradually with aging and/or solar damage.[9]

Thus, these factors together lead to anincrease in skin sagging and a"surplus" ofskin on the face and neck.

2. *Muscular action*

In youth, the muscles of facial mimicry have a curvilinear contour with anterior convexity on the surface, which makes them project outward. This manifests as a bend in the fat compartment underneath the deep face of these muscles, acting as a mechanical slide plane. The motion amplitude of the muscle is equally greater. Over time, the convex contour becomes flat and the underlying fat is expelled from behind the muscles, causing an increase in the superficial fat.[3]

The frontal muscle has little underlying fat. During contractions, maximum pressure is exerted on its central functional area, where the elevating and depressor forces converge, over time producing upper (frontal collisions) and lower (supercilliary arch) convexity due to resorption of the central horizontal bone.

The muscles of the glabellar region are responsible for the main evident alterations of aging in the upper third of the face, for they have a strong depressant action. The corrugator, procerus, depressor supercilii, and the upper portion of the orbicularis oculi muscles belong in this region. Their joint action contributes to the facial appearance of tiredness and boredom, as well as to the increase of skin in the upper palpebral region and to the displacement of fat pads in this region.

The contraction of the orbicularis oculi muscles are also responsible for facial aging, leading to the protrusion of the

Table 2: Deep fat compartments of the middle third of the face

DEEP FAT COMPARTMENTS OF THE MIDDLE THIRD OF THE FACE		
FAT COMPATMENTS OF THE DEEP MEDIAL CHEEK (DMCF)		**INFRAORBICULAR FAT COMPARTMENT OF THE EYES**
MEDIAL	**LATERAL**	Deeply to the lower eyelid's orbicularis oculli muscle
Deeply and medially to the NLF	Deeply by the SMC	Densely adhered to the periosteum
Limited by the Ristow's space, inferiorly by the maxilla	Laterally to the buccal fat compartments buccal extension	Branches into lateral and medial

orbicular fat, resulting in palpebral bags, in addition to contributing to the fall of the eyebrow tail, to the onset of periocular rhytids (crow's feet), and to the increase in cutaneous ptosis in the palpebral region. Repeated contractions of the corrugator supercilii muscle expel the deep fat compartment, contributing to the erosion of the bone of the orbit.

The upper lip and nasal ala levator muscle is a combination of two other muscles: one superficial (levator of the nasal ala) and one deep (levator of the upper lip). Its repeated contractions expel the fat (inferior and deeply) from the canine fossa and (superficially) from the nasolabial fold, flattening the convexity of the anterior malar region. Over time, a depression that increases noticeably with the smile movement appears above the nasolabial fold, in the paranasal area. The deep fat, which in youth is located between the cutaneous insertion of the levator muscle of the nasal ala and the pyriform orifice, is also expelled to the nasolabial fold.

With aging, the zygomaticus major and minor muscles expel the deep underlying fat located in the lower region, leading to the emptying of the jugal area. The muscles of facial mimicry are particularly strong in the periorbital and perioral areas. Their repetitive contractions combined with the increase of tonus at rest not only expel the underlying fat, but also exert constant pressure on the bone, favoring its erosion. Repeated contractions of the orbicularis oris muscle lead to the appearance of perioral rhytids, in addition to aiding in the reduction of volume and the loss of lip contour.

Repeated contractions of the depressor anguli oris muscle, combined with the elevation produced by the mentalis muscles, expel the underlying fat towards the upper middle cervical region by increasing an excess of skin. Furthermore, the resting tonus of the depressor muscles of the mouth and of the angle of the mouth increases over time, depressing the commissure and deepening the labiomental fold.[4] Below the mandible, contractions of the depressor anguli oris muscle stimulate the platysma muscle, expelling the deep fat anteriorly.

In youth, the platysma has a configuration in the shape of an hourglass, simulating a narrower "waist" between its inferior transversal origin and the upper transverse insertion that helps to define the cervicomandibular angle. With aging, its tonus at rest increases and its vertical length shortens, leading to the formation of anterior bands that delete the cervicomandibular angle. Over time, the platysma muscle's contractions expel the fat deep and anteriorly in the submental region.

3. *Facial fat compartments*

Facial fat is divided into separate compartments that are limited by distinct anatomical units and their own vasculature (Tables 1 and 2). Coleman et al. described different fat compartments, subdivided into regions: periorbicular, temporal, perioral, middle third of the face, cheeks, and mandibular.[10]

The fat compartment of the periorbicular region is distributed between the upper and lower eyelids. The orbit presents an almost uniform loss of volume, and is more important in the upper medial and upper lateral compartments. The loss of volume in the upper region of the orbit causes a deflation of tissues towards the cilliary margin, causing excess skin and a sunken appearance. [3,7,10]

The volume in the temporal region is also influenced by the temporal muscle and the deep and superficial fat compartments. In aging, there is an atrophy of fat over the frontal process of the zygomatic bone and superior zygomatic arch, which can thus become visible. [3,7,10]

In the perioral region—which is predominantly composed of the orbicularis oris muscle—a relative absence of fat occurs. During aging, the upper lip usually becomes thinner, and there is less protrusion of the maxillary bones and an inversion of the lip. The lower lip loses the fullness of its submucosa, and reverses. [3,7,10] The most significant loss of fat takes place in the middle third of the face, especially in the pre-auricular, buccal, and malar areas, leading to convexities. In more severe cases this can cause a skeletal appearance. [3,7,10]

In the maxillary region, the angle and the mandibular body—with their overlying masseter and platysma muscles—define the inferior border of the lower portion of the face, delineating the mandible's contour. With aging, remaining fat deposits that descend and deform the mandible's border can occur, reducing facial fullness. [3,7,10]

In a study employing contrast tomography on the faces of cadavers, Gierloff et al. proposed a different classification for the fat compartments described above. The compartments were divided into the fat of the facial middle third—consisting of two layers (superficial and deep)—and the fat of the paranasal region—anatomically divided into three different layers.[2] (Figure 3)

The facial middle third's fat superficial layer is composed of: nasolabial fat, medial and middlecheek fat, the temporofrontal compartment, and three orbital compartments. The deep layer fat is constituted by the infraorbicular fat and the medial and deep cheek fat. Three distinct layers of fat compartments are found in the pyriform aperture, where the compartment is located posteriorly to the medial portion of the deep medial cheek fat.[2]

The nasolabial compartment is subcutaneous and oval in shape. Its upper border is located in the lower contour of the orbit, and its inferior extension is adjacent to the fat of the superior mentum. It is limited laterally by the medium malar fat and infraorbicular fat. The medial border is composed by the maxilla and the lateral compartment of the upper lip. The fat compartment of the medial cheek is located laterally to the nasolabial compartment. The lower limit is set bythe mentum's fat and the buccal extension of the buccal fat. It is limited laterally by the fat of the medium cheek region and the lateral orbital compartment. Its posterior border is formed by: orbicularis oculi muscle, the deep medial cheek fat pad and the buccal fat pad.

The medium cheek's compartment is located anteriorly to the frontotemporal compartment and laterally to a line perpendicular to the lateral orbital rim. Its anterior limit is the fat of the malar regionand a small portion of the buccal fat pads. Its superior limit is the lateral orbital compartment. The deep

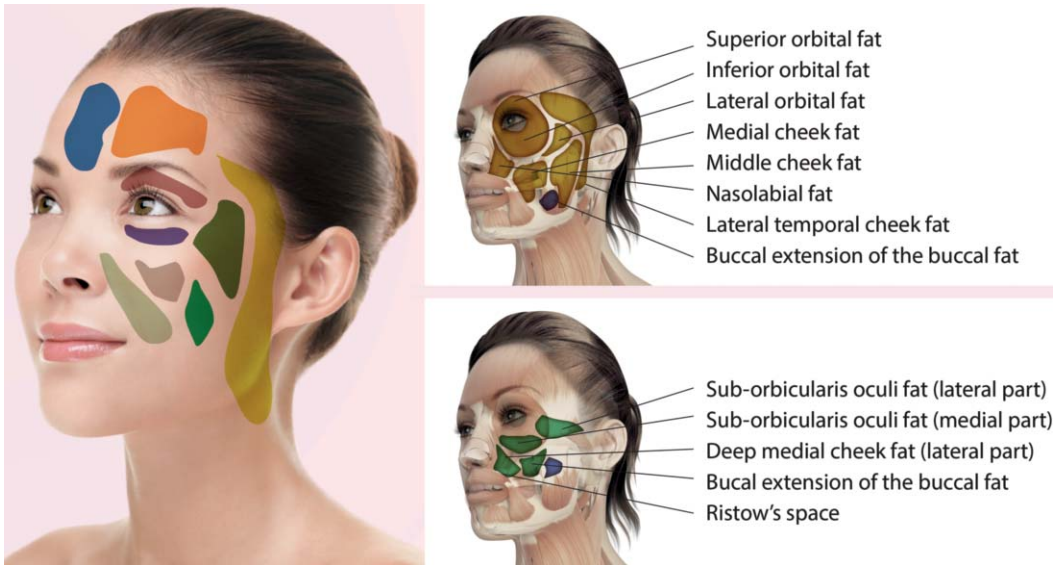

Figure 3: Fat compartments of the face.(Adapted from Girloff et al. [2])

medial cheek's fat compartment is subdivided into a medial and a lateral portion. The medial portion is located underneath the nasolabial compartment, but extends farther medially. It does not immediately rest on the maxilla's periosteum, being posteriorly limited by a small triangular compartment. Its lateral portion limits the superficial medial cheek's fat. It is superiorly limited by the infraorbital fat, and laterally by the buccal fat pad. The compartment rests medially on the deep medial cheek fat and laterally on the maxilla. The infraorbicular fat is divided into two: the medial portion is located above the maxilla's periosteum, and its lower portion, above the lateral portion of the deep medial cheek's fat; the medial portion of the infraorbicular fat is covered by the nasolabial fat and medial cheek. The lateral portion of the infraorbicular fat is located beneath the lateral orbital fat compartment and the medial cheek.[2]

The buccal fat compartment plays an important role for it runs from the deep paramaxillary space up to the lower superficial subcutaneous plane of the zygomatic bone. The buccal extension of the buccal fat compartment is deemed as a portion of the posterior lobe. However, Gierloff et al. observed in 29% of the cadavers studied that the buccal extension of the buccal fat pad can be considered a separate compartment for displaying a limited anatomical site—in this specific case, a third layer.[2] This compartment is located inferiorly to the zygomatic bone and anteriorly to the mandible's branch, around the masseter muscle. Only a small portion of the compartment is located in the paramaxillary space. The subcutaneous portion of this fat compartment is composed of the medial cheek fat, deep medial and central fat, infraorbicular fat, mentonian fat, and premasseter space fat, possibly being related to the support of all these fat compartments.[3] The orbital region is divided into superior, inferior and lateral compartments. The inferior orbital fat compartment is located in the subcutaneous plane, beneath the middle portion of the orbit's bone, with its inferior border running along this same inferior course. The compartment's inferior limit is the cheek's medial, central, infraorbicular, and nasolabial fat. The superior orbital fat compartment is located immediately beneath the skin of the upper eyelid. Its upper border follows the course of the orbital bone, and its lateral portionis located on the lateral of the orbital bone. The inferior border of the lateral orbital fat is the medial cheek's fat. The lateral orbital compartment, the superior border follows a virtual line that runs between the superior orbital contour and the temporomandibular joint. The compartment's lower portion overlaps the lateral portion of suborbicular fat. The lateral orbital fat is limited laterally by the temporal cheek's fat.[2]

Alterations related to the decrease in volume, atrophy, and migration to lower regions of the face of these fat compartments are probably the main factors of structural changes linked to the aging of the face.

More recently, Wan et al.[11] studied 63 hemifacial cadaver dissections and observed three main alterations: 1) adipocytes of superficial fat compartments were larger when compared to adipocytes from deep fat compartments; 2) the adipocyte's size in nasolabial (NLF) and in deep medial cheek (GBMP) fat compartments in men is significantly smaller when compared to women's; 3) the adipocyte's size in the nasolabial compartment (NLF) in patients with normal body mass index (BMI) is significantly higher in women than in men. This corroborates to the clinical and anatomical observations that suggest that there are morphological differences between the superficial and deep compartments of fat, specifically selective atrophy in the deep fat compartments in the elderly. This finding can be clinically relevant for the purposes of volumetric facial rejuvenation.

4. *Facial bone remodeling*

The areas with a predisposition to bone remodeling correspond to the moving parts of the face, especially to the superomedial and inferolateral areas of the orbit, pyriform region of the nose, mentum, and particularly the maxilla, in which this

process is more prominent.

The alterations occur with age, and therefore produce a protrusion of the glabella, expansion of the supraorbital wrinkles, lateral translation of the orbit, increasing depth, lateral expansion of the cheeks, and increasing size of the nose and mentum.

The orbit's medial fat pad also becomes more prominent with age, possibly resulting from the resorption of the upper border of the orbit.

The middle malar region manifests more complex alterations in soft tissue as a result of aging. The development of deformity in the nasojugal fold, malar fat, and prominent nasolabial fold can, to a significant degree, be attributed to some fat loss or ptosis, linked to aging.

The loss of the projection of the maxilla contributes to the increase in the pyriform aperture, due to the fact that there is a decrease in the support both of the nose and of the upper lip, resulting in the ptosis of the centrofacial region and entailed elongation of the nose up until the upper lip.

The maxilla is the bone that undergoes greater remodeling with aging, the consequences of which are noticed on the cheek. The maxillary bone gives rise to other bones—and respective function—that form the orbit. In youth it expands to accommodate the growth of secondary dentition, which develops within the bone, resulting in a great reduction in volume, especially in its inferior portion.[12]

With aging, the lower third of the face undergoes vertical maxillary shortening, affecting dental and skeletal structure. This negative combination also influences the patient's smiling function, thereby reducing the exposure of the upper and anterior teeth. Sometimes, the structural factors of aging are not easily detected due to the compensation offered by the soft tissues, which in a young individual plays an important camouflage role.[13]

QUADRALIZATION OF THE FACE

Based on the observation of facial shapes, on the experience acquired with the use of cutaneous fillers for volume replacement, on studies of facial aging processes[2,3,7] and on contour alterations resulting from aging, a new nomenclature and approach to the alterations in the facial contour resulting from aging is proposed: the "quadralization" of the face. Some authors believe that in adolescence the face has the shape of a heart or inverted triangle and that, with aging, the triangle's position reverses, changing its base to the line of the mandible. The authors however, believe that all faces have a unique shape, similar to that of an inverted trapezoid, with the superior limit being constituted by a line running along the most projected portions of the zygomatic bone and with the lower limit being defined by a line drawn laterally to the mentalis muscles, approximately in the junction of the depressor muscles of the lower lips with the mandible. What varies from one individual to another, both in men and in women are this trapezoid's internal angles, which can be more or less acute depending on the facial shape.

In this manner, rather than approaching the facial alterations occurring from aging as the reversion of the triangle from youth, the authors observed an increase in the upper angles of the trapezoid, accompanied by a minor shortening of the superior line (zygomatic bone resorption) and a decreasein the inferior angles accompanied by an evident increase in the trapezoid's inferior line (displacement of facial structures towards the lower third of the face), so that this inverted trapezoid will tend to become a square over the years, regardless of gender, race, and facial shape. The changes in facial contours that characterize this process are related to the four aesthetic pillars associated with aging. Therefore, healthy lifestyle habits associated with aesthetic treatments targeted at each of these pillars can possibly preserve the beauty of the face for longer, mainly due to the maintenance or improvement of its tridimensionality.

CONCLUSION

Based on the literature descriptions of structural changes of the face and clinical experience, a new nomenclature, defined as facial "quadralization" is proposed for the alterations of facial contours resulting from aging. This approach can possibly assist in directing and developing new forms of aesthetic treatments aimed at maintaining and/or restoring the three-dimensional shape of the face, altered by the passage of years. ●

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Dermoscopy of pigmented mucosal lesions and considerations for a case of melanoma of the lip

Dermatoscopia das lesões pigmentadas das mucosas e considerações sobre um caso de melanoma do lábio

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ABSTRACT

The observation of mucous membranes should be part of a dermatological examination. It is known that early diagnosis is critical for the prognosis of patients with malignant melanocytic lesions. Nevertheless, integrating this step into the examination routine and performing a differential diagnosis between benign and malignant mucosal lesions with only clinical signs, are great challenges. Dermoscopy is still seldom-used for pigmented lesions of mucous membranes, however recent studies have shown its potential. In light of a case of melanoma of the lip, the authors provide tips and data from the literature that highlight the usefulness of the technique, and support the use of dermoscopic examination in the dermatologist's routine.

Keywords: dermoscopy; hutchinson's melanotic freckle; keratosis, actinic; face.

RESUMO

A observação das mucosas deve fazer parte do exame dermatológico. Sabemos que o diagnóstico precoce é fundamental para o prognóstico dos pacientes com lesões melanocíticas malignas; integrar essa conduta na rotina e realizar diagnóstico diferencial entre lesões benignas e malignas das mucosas apenas com sinais clínicos são, entretanto, grandes desafios. A dermatoscopia ainda é pouco utilizada para as lesões pigmentadas das mucosas, porém estudos recentes têm mostrado seu potencial. A propósito de uma caso de melanoma labial ressaltamos a utilidade da técnica com dicas e dados da literatura que auxiliam o exame dermatoscópico na rotina do dermatologista.

Palavras-chave: *dermatoscopia; mucosa bucal; melanoma;lábio.*

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Early diagnosis is the cornerstone of managing malignant melanocytic lesions. The authors highlight that this is a crucial role of dermatologists, and that there is a daily challenge in achieving a complete dermatological examination of their patients. Mucous membranes are still neglected,[1] and many patients with mucosal melanoma report that they have had undiagnosed pigmented lesions for months or years.[2] The authors acknowledge the technical difficulty of carrying out the diagnosis of mucosal lesions, whose clinical signs do not always help in the differential diagnosis from benign pigmented lesions—which constitute the vast majority—and the rare malignant lesions.[3] The criteria of classical dermatoscopy of skin lesions are not directly applied to mucosal lesions, however in

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spite of the few studies in this area, this examination technique may prove very useful for the rational selection of lesions that deserve pathological study.

Linked to this paper's subject, the authors present the case of a 64-year-old Caucasian male patient, a former smoker, who reported the appearance and growth of a blackish spot on the lower lip, four years before. Clinical examination revealed that the lesion extended from the center of the lip up to the mucosa, measuring 4 x 1cm (Figure 1).

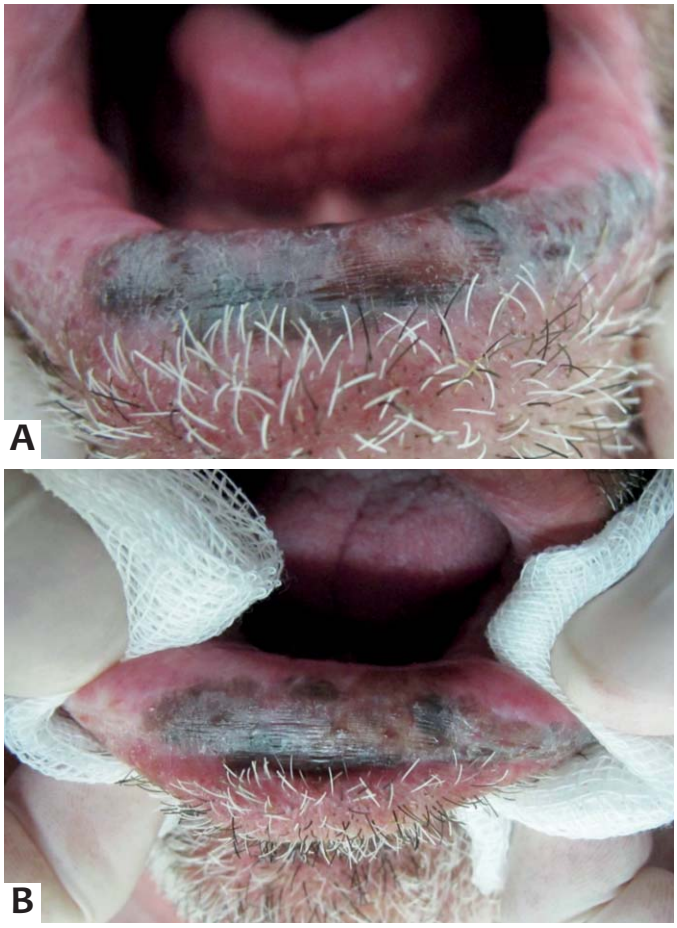
Dermoscopic examination found that the pigmented lesion presented a multicomponent pattern (Figure 2). Excisional biopsy was performed, with histopathology demonstrating melanoma *in situ* with lentigo maligna pattern (Figure 3). The patient is well and has been monitored for two years after the widening of margins by1cm (Figure 4).

Primary melanomas of the lip are rare, representing 0.05-0.31% of all melanomas and 0.3-2.2% of head and neck melanomas. They predominate in male patients (2:1), and usually occur after the age of 50, with the extensive superficial variant being the most common type. These lesions have aggressive behavior, with reported recurrence of 40%, metastases in 36% and deaths in 60% of patients.[4]

In 2011, a retrospective multicenter study coordinated by the International Dermoscopy Society[3] that included 140 pigmented lesions of mucous membranes, has proposed two simple and very useful models for differentiating benign from malignant lesions.

In the first model, the presence of blue, gray, or white color occurred in100% of the malignant lesions in the study; this fact was considered the main feature in differentiating malignant from benign lesions in the study (100% sensitivity and 64% specificity for melanomas). A pattern of an "absence of structures"—which is defined as the absence of other identifiable patterns (such as dotted, globular, circles, or linear) regardless of color—was also statistically significant. This pattern was present in 100% of melanomas, but also in half of the benign lesions (53.2%). However, in the latter they were usually brown in color, and always featured an absence of blue, gray, and white colors. When added to the color model, the pattern "absence of structures" increases the specificity for melanoma from 64% to 82%, even if present only in some areas of the lesion. Due to its high specificity, it is worth noting the importance of the "multicomponent pattern" (presence of three or more patterns in the same lesion) in other case series reported in the literature. 5

In the present case, it is important to note that the dermoscopy shows a wealth of signals that are not seen with the naked eye. By applying the new diagnostic models, the authors corroborate their validity for they have found not one, but three colors deemed suspect: blue, gray, and white—in addition to brown—as well as the pattern "absence of structures". The authors have also considered that the other three patterns –parallel lines in "fingerprint" pattern, circular pattern and atypical globular pattern– characterize the lesion as having a multicomponent pattern, further reinforcing the suspicion of malignant melanocytic lesion.



Figures 1 A and B: Macule with areas of grayish and dark chestnut color in the lower lip, extending to the mucosa

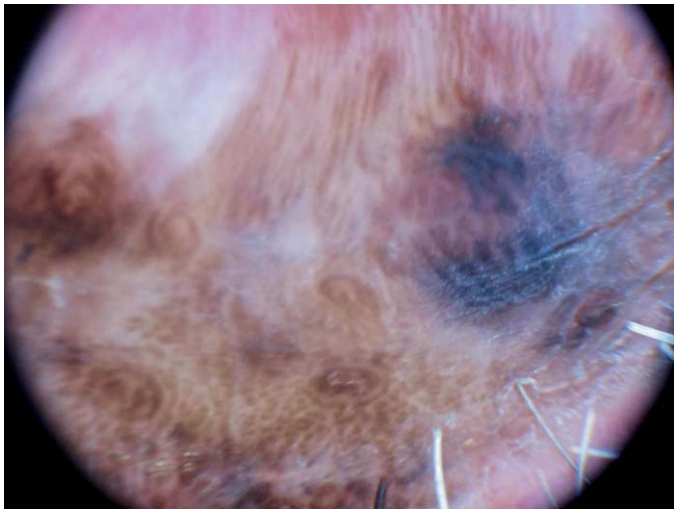
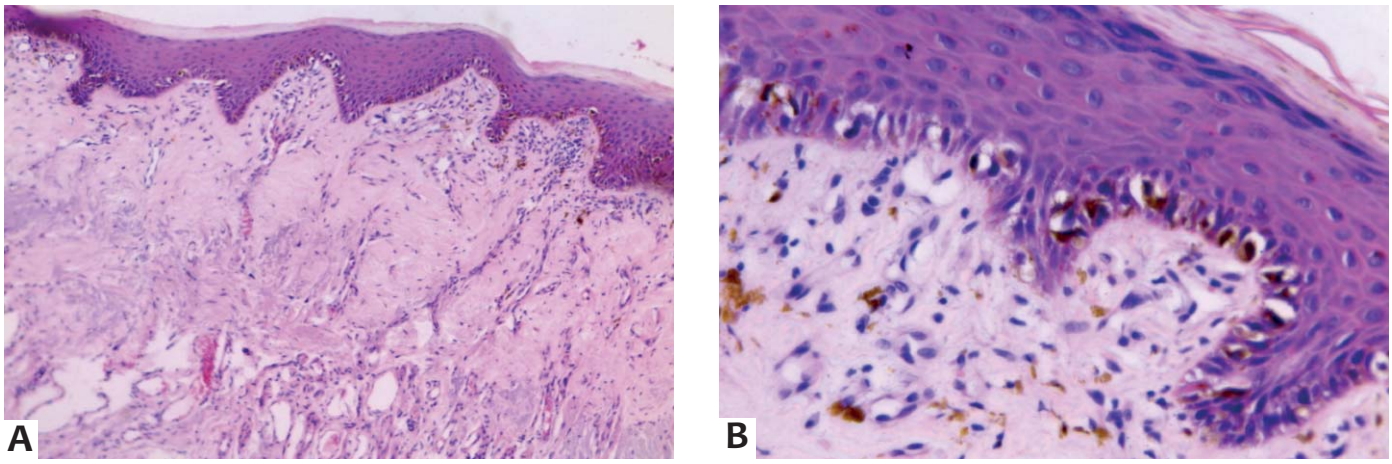


Figure 2: Dermoscopy image with multicomponent pattern and multiple colors (blue, gray, white, and brown) standard. A white color "absence of structures" pattern can be seen at 10:00 am, while a bluish-gray color "absence of structures" pattern can be seen at 3:00 pm. In addition, the parallel lines in "fingerprint" pattern (1:00 pm), and the circular pattern and irregular globules (6:00 am – 8:00 am), can be observed



Figures 3A and B: Lentiginous melanocytic proliferation with severe atypia. Melanoma in situ with lentigo maligna pattern (HE 100-400x)

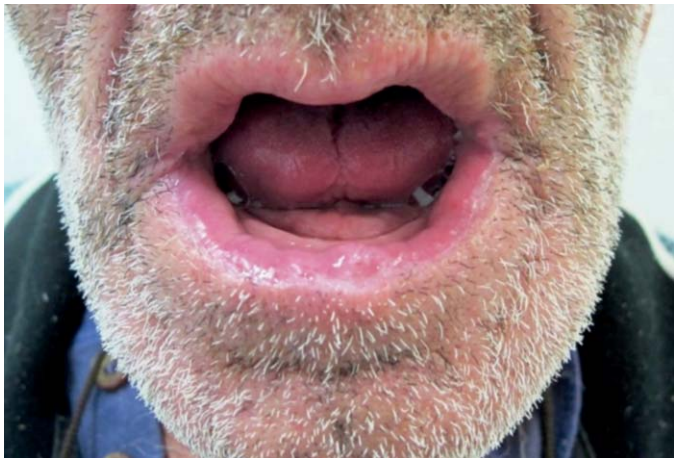


Figure 4: Three-month post-operative of the widening of margins, maintaining aesthetic and functional aspects

It is necessary to consider that despite the great variationin patterns associated with benign mucosal lesions, the identification of the suspected color model with the presence of the pattern "absence of structures" seems to be very useful for a more rational selection of lesions to be excised for anatomical pathological examination.

Last but not least, the authors provide some important guidelines for good dermoscopic examination of the mucous membranes: proper positioning of the patient for examination; using PVC film to protect the dermatoscope from direct contact with the lesion; obtaining digital images of the lesion for analysis on the computer rather than performing analysis on the patient. In the authors' experience, these tips make the procedure easier, safer, and also more acceptable to the patient. ●

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Oriented biopsies in cutaneous oncology

Biópsias orientadas em oncologia cutânea

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ABSTRACT

Oriented biopsies are fragments of tissue (usually fusiform) that are positioned relative to the tumor in a way to favor the observation of its histology in a panoramic and topographical manner. Commonly performed on the edge of a tumor, an oriented biopsy allows for better surgical planning, eventually helping to decrease the number of stages of micrographic surgery. The present article details the procedure's technical execution not only from a surgical, but also from a laboratorial perspective.

Keywords: biopsy; ambulatory surgical procedures; mohs surgery; pathology, surgical; skin neoplasms

RESUMO

Biópsias orientadas são fragmentos de tecido, geralmente fusiformes, posicionados em relação ao tumor de maneira a observar sua visualização histológica de modo panorâmico e topográfico. Realizadas comumente nas bordas do tumor, permitem melhorar o planejamento cirúrgico, eventualmente ajudando a diminuir o número de estágios em uma cirurgia micrográfica. Este artigo detalha a execução técnica do procedimento dos pontos de vista cirúrgico e laboratorial.

Palavras-chave: *biópsia; procedimentos cirúrgicos ambulatoriais; cirurgia de Mohs; patologia cirúrgica; neoplasias cutâneas.*

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INTRODUCTION AND CONCEPT

In cutaneous oncology it is not uncommon to come across tumors with poor clinical demarcation—a situation that can hinder defining even the starting point for an excision.

Tumors with predominantly infiltrative growth may offer difficulties for their detection, especially in the early stages, when the clinical appearance is that of hypopigmented macules or slightly elevated plaque with poorly defined margins. These lesions arise mainly on the face of patients with fair and photodamaged skin. In some cases, multiple procedures (curettage and eletrocauterization, cryotherapy, and even surgery), in addition to the use of topical medications (5-Fluorouracil, imiquimod and others), which can cause partial regression of tumors, can still compromise the determination of boundaries.

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Although indistinguishable in those situations, a tumor's margin can be further examined through a topographically oriented, narrow fusiform excision, which can provide more comprehensive information and through which it is possible to view the tumor along a variable extent. This would be the theoretical conception of an oriented biopsy (Figure 1).

Depending on the size of the tumor and its predominant histologic type, the oriented biopsy may be incisional or excisional. Conceptually, nothing prevents the use of an oriented biopsy in tumors that are clinically well visible, however this technique is more useful in the evaluation of tumors with difficult clinical delimitation or that conflict from a histopathological point of view.

TECHNIQUE

The extent and orientation of the fusiform excision will depend on the required or needed overview. In this way, it is possible to plan more than one fusiform excision in different orientations (one latero-lateral and another cranial-caudal, for instance). As for the longitudinal extension, it would be advisable that it did not exceed 2cm, as that could hinder its inclusion in the histological preparation, since ordinary microscope slides are 2.5cm wide. This however does not constitute a limiting factor, given that it is possible to prepare the slide in its longitudinal direction, enabling specimens of over 2.5cm long. However, from a practical standpoint, the maximum length of 2cm appears to be sufficient in most cases.

It is important that the ellipsis is not wide, but very thin, as this will facilitate the inclusion of the material. However, ellipses that are too thin may prove fragile and rupture during the laboratory process, which would undermine the purpose of such an examination.

Once the orientation of the fusiform excisions are established, a suture will be placed at one end to mark it—conventionally, by the side that is potentially tumor-free. A sketch of the entire topographical situation is drawn, instructing the laboratory to stain the ellipses' opposite sides in different colors, thus orienting the cut and the biopsy. Preferably, these details should be photographed, avoiding future difficulties of interpretation when the blades are finalized.

The laboratory must be familiar with the procedure, otherwise undue cuts and cleavages may occur. Cleaving the fragment should be avoided. It is easier and safer to include it in its entirety so that one of its sides is completely presented to the microtome knife. Preferably, the block should be trimmed in its longitudinal direction up to the point where the central regionbe reached. In this manner, it is possible to obtain an overview from one end to the other, distinctly stained.

Situations of applicability of the technique

1. Planning of the initial incision in cases of micrographic surgery, as already illustrated in Figure 1.

2. Collection of more reliable data than that provided by punctiform multiple biopsies, which may fail for lack of the panoramic view (Figures 2 to 4).

3. Complete study of the lateral and deep borders of the tumor (Figures 5 and 6).

DISCUSSION

Although no specific bibliographic reference on the subject in the literature has been found, one might intuitively think that this procedure is already routinely carried out, due it to being straightforward and logical. While this may be true, it is important to describe the method and standardize it, in order for its straightforward approach to be widely assimilated and for it to become useful in different clinical and surgical situations. The author is unaware of any similar procedure that may have been previously published or detailed in the 57 articles on

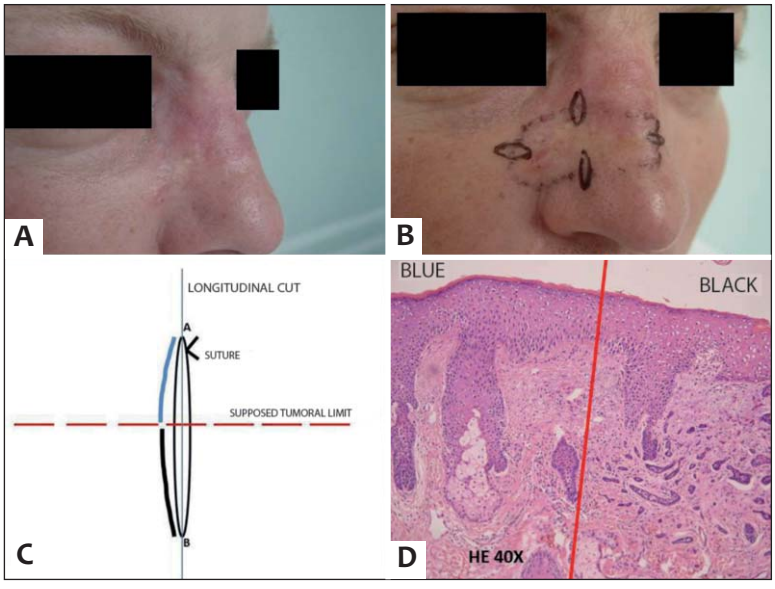

Figure 1: A - Infiltrating basal cell carcinoma with multiple recurrences. Where are the tomor limits? Where should the incision be made? **B –** In dermatoscopy, for example, a hypothetical boundary can be drawn. How to prove it? **C** - Schematic representation of anoriented biopsy. The piece will not be cleaved, however trimmed until it is halfway, yielding a longitudinal and panoramic section, from point A to point B. By convention, a suture stitch marks the point likely to be tumor-free, with the two ends distinctly stained for guidance in the histological section. **D** - The histological section shows a detail of the tumor border, as if a line could be drawn from which there would be a presence of tumor cells (red line)

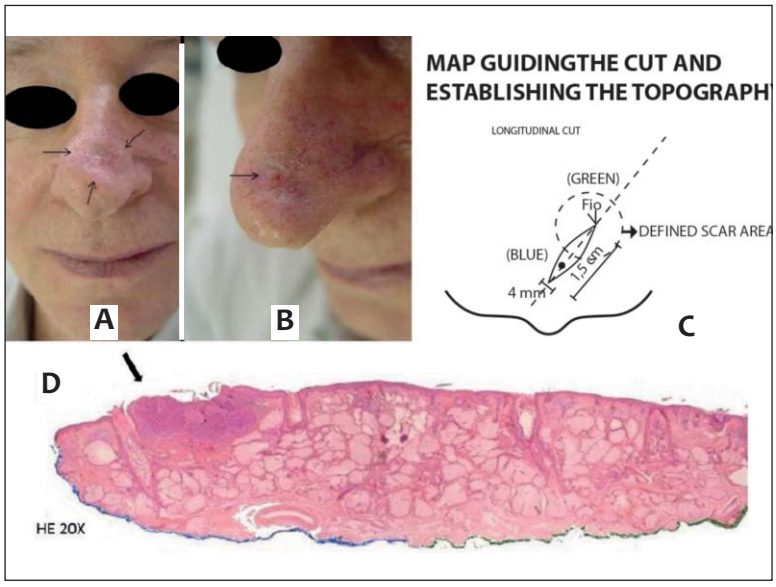

Figure 2: A - Patient referred for micrographic surgery for presumed recurrent tumor previously treated with cryotherapy (large depressed area - arrows). **B -** Next to the depressed area, a papule of recent onset (arrow) is the cause of the suspicion that the whole area is affected by tumor recurrence. **C -** Afusiformoriented biopsy of 1.5 x 0.4cm was carried out in order to panoramically study the area involved, according to the photographed map sent to the pathologist. **D –** Overview of the oriented biopsy showing an isolated and expansive tumor in the blue end (arrow)– probably a new tumor. Sebaceous hyperplasia occupies the green area: theoriented biopsy may have been excisional, as the margins are free. The oriented biopsy has avoided the implementation of a micrographic surgery, removing the hypothesis of recurrence. All evidence indicates that it was a new isolated tumor.The patient was observed for three years without clinical or dermoscopic alteration in the region

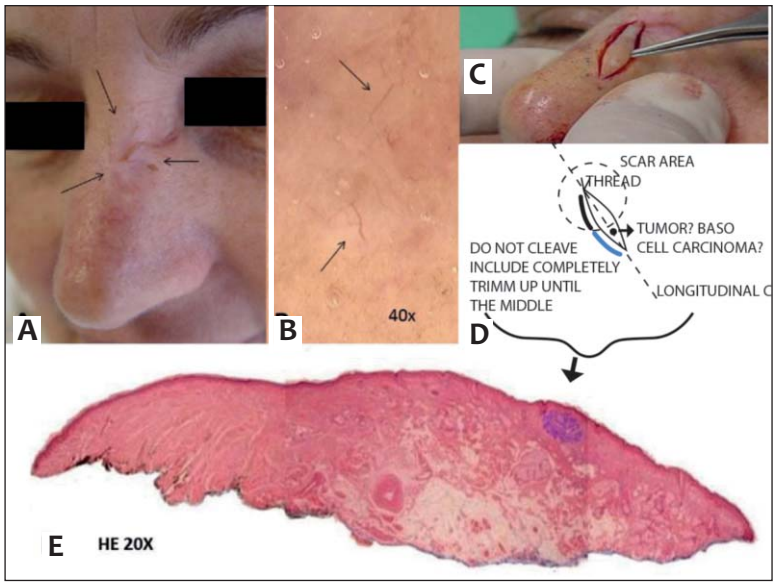

Figure 3: A - Patient referred for micrographic surgery due to alleged recurrence. Five years before had undergone curettage and electrocoagulation for basal cell carcinoma throughout the region indicated by the arrows. Recent biopsy in this area, with 2mm punch, revealed basal cell carcinoma. All of the cicatricial area would be removed through micrographic surgery? **B –** Complete dermoscopy with great magnification was performed in the whole region. Thin arboriform vessels (arrows) indicated the possibility of a basal cell carcinoma. **C –**The oriented biopsy was performed containing the previously marked area through dermoscopy at one end of the ellipsis. The other extremity penetrated much of the scar area, which had imprecise borders. **D -** Biopsy ready for pathology with the sketch of the topographic situation and additional instructions for the technician. **E -** Overview of the oriented biopsy, in which a small expansive basal cell (arrow) is seen coinciding with the dermoscopic finding. The remainder of the biopsy does not reveal neoplasia. It was a new tumor. There was no indication of micrographicsurgery

"biopsies" that have been researched. The same situation applies to the references listed in the present study,[1-12] allowing the inference that this is probably an original piece of research.

For this reason, there are no specific bibliographic references in the present article, with the exception of two, 13 and 14, which serve only for compliance reasons.

Although it is difficult to prove the usefulness of oriented biopsies due to the variability of the clinical and surgical circumstances, the author has reviewed the cases in which the method was applied in 173 situations in the previous five years, noting that in 93% of cases the histological information obtained was important in the implementation and completion of various clinical and surgical situations.

The data obtained can be summarized and grouped as described in the section *Situations of applicability of the technique*.

In cases where the oriented biopsy is considered as an excisional biopsy, the surgeon has to relativize the findings, understanding that in certain situations, if the ellipsis was very narrow and the tumor found to be predominantly infiltrative, the presence of the free margin in the longitudinal direction

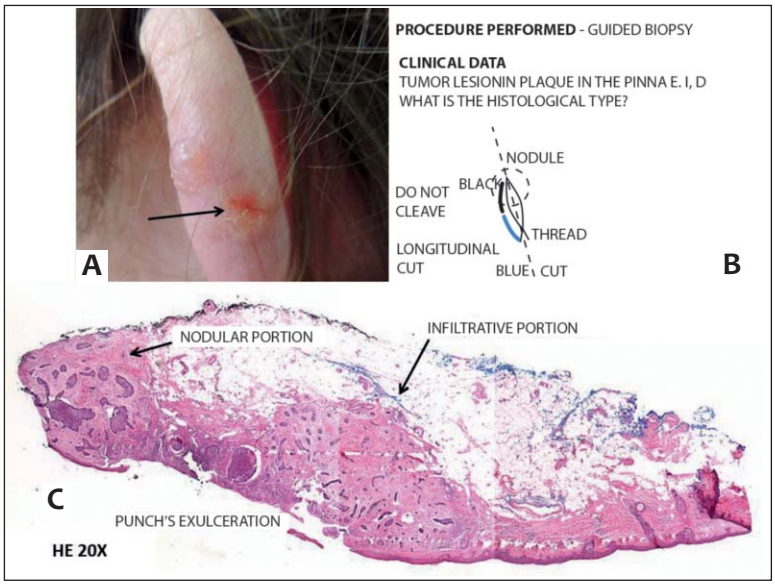

Figure 4: A – Previous punch biopsy in the exulcerated site (arrow) revealed solid circumscribed basal cell carcinoma. **B** - Scheme of the oriented biopsy performed through the mark of the punchand instructions to the laboratory. **C** - Theoverview of the oriented biopsy reveals a tumor with more nodular pattern in the black end,a solid circumscribed pattern where there was exulceration of the punch and a frankly infiltrative pattern on the blue side.Were it not for the oriented biopsy, the tumor would have been considered of low malignant potential

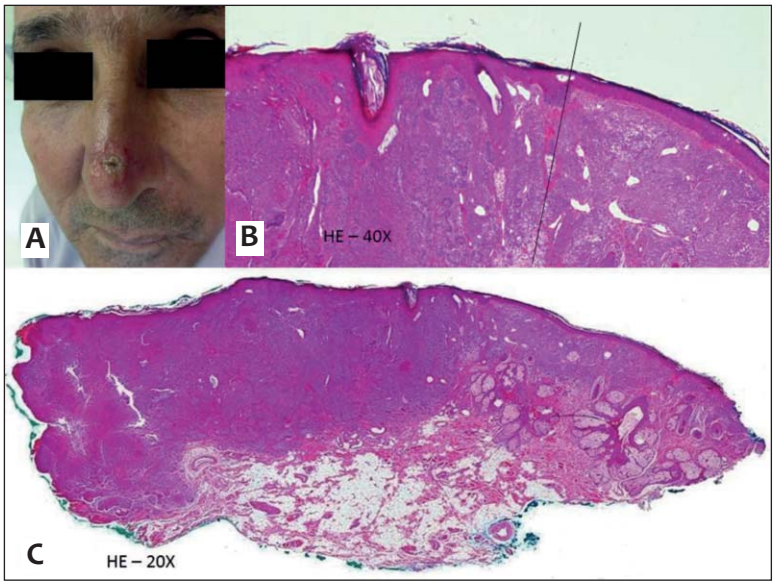

Figure 5: A – Basal-squamous carcinoma that recurred twice, during more than three years of development. The patient is a bearer of chronic lymphocytic leukemia. Aiming at avoidingan excessive number of stages of micrographic surgery,an oriented biopsy was performed in the tumoral border, as in the previous examples. **B –** Tumoral border clearly visible laterally (black line) and concomitant intense solar elastosis. **C** - Overview of the oriented biopsy. Opposite/contrary to what was expected, the tumor was still histologically relativelycircumscribed. With no major safety margins suggested by the oriented biopsy, the tumor was removed with a single micrographic surgery stage (Mohs method)

does not mean that the lateral margin is free. In this case, transverse serial sections along the piece, with free margins do not guarantee that the tumor has been completely removed.[1]

Due to the fact that in many situations the tumor can hardly be seen, dermoscopy can be a decisive factor indicating the need for surgical intervention.[2] However, it is not always sufficiently clarifying. In such cases, confocal microscopy would be considerably useful in spite of its limited ability to offer deep assessments. As this technology is still very expensive and is not yet widely available, the use of dermoscopy combined with oriented biopsies can provide extremely important data to allow better surgical planning.

Performing multiple punch biopsies does not amount to an equivalent procedure, as tumors are not always continuous. An oriented biopsy containing a tumor may reveal sites that do not contain a tumor, whereas a punch biopsy could prove negative. On the other hand, the positivity of the punch does not mean that the tumor can extend far beyond that point.

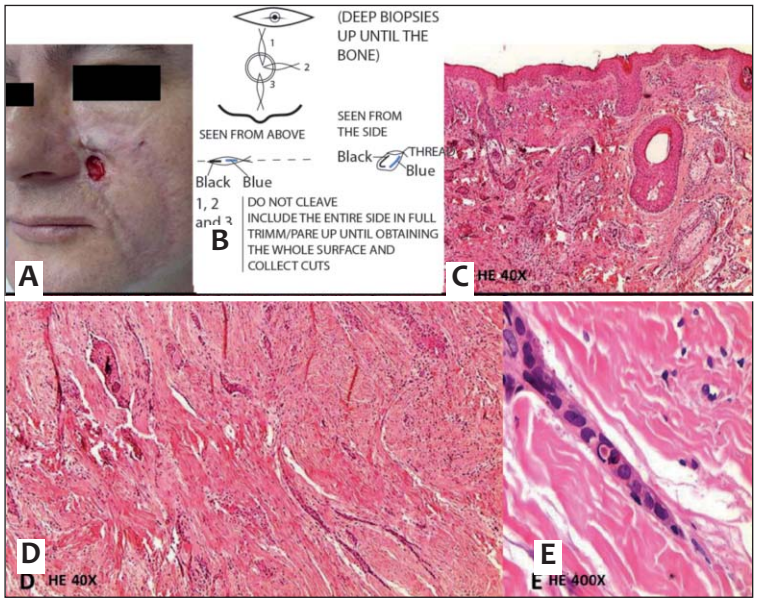

Figure 6: A - Basal cell carcinoma that had recurred four times, adhered to the bone. Would it be possible to observe tumoral margins in the ulcer region? How would this tumor margin be from the histological point of view? **B -** As the sketch sent to pathology illustrates, three oriented biopsies were carried out, reaching the depth up until the bone plane. **C -** Although the tumor is very infiltrative, the tumor border is laterally visible. **D -** Appearance of the tumor towardsthe deep plane. There is no reliable margin. Isolated tumor cellcords interwinewith the bundles of collagen fibers. **E -** Detail of a bundle of cells. With this data it was possible to removethe entire tumor witha single stage of micrographic surgery (Munich method), without major lateral safety margins, removing all the periosteum in the deep plane

Recurrent tumors are usually adjacent to an area of scarring. Many surgeons advocate the complete removal of the scar, as it can be frustrating to prove through micrographic surgery whether it was free of a tumor (which could be growing in another direction). In such cases, performing an oriented biopsy in the pre-operative assessment phase, could better guide the micrographic surgery, helping it to fulfill its primary role: to remove only the tumor.

The concept of an oriented biopsy derives closely from surgical excision with microscopic control of the margins, i.e. from the understanding of the logics of the micrographic surgery. The more the subject is known, the more informative the oriented biopsies can be. Also, it is very important to rely on a laboratory that is familiar with these techniques. In the absence of a laboratory able to correctly perform the procedure, a surgeon who has an in-depth understanding of micrographic surgery can provide adequate guidance. ●

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Case Reports

Reactions to red pigment

Reações ao pigmento vermelho

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ABSTRACT

A great number of agents have been implicated as the cause of skin reactions to tattoos—especially red pigment. Dermatologic reactions are very diverse. The present study is aimed at reviewing the literature and illustrating the treatment performed at the authors' medical facility. Despite treatment with topical or intralesional steroids, most dermatologic reactions persist for a long time. Resistant reactions can be treated through excision, sometimes causing significant scarring. Despite the popularity of tattoos, adverse inflammatory reactions are common and can present a sizeable clinical challenge.

Keywords: primary treatment; surgery, plastic; tattooing.

RESUMO

Um grande número de agentes causadores de reações cutâneas em tatuagens tem sido implicado, especialmente o pigmento vermelho. As reações dermatológicas são as mais diversas possíveis. O objetivo deste estudo é realizar a revisão da literatura e ilustrar o tratamento realizado em serviço público. Apesar do tratamento com esteroides tópicos ou intralesionais, a maioria das reações dermatológicas persistem por longo tempo. Reações resistentes podem ser tratadas por meio de excisão, deixando algumas cicatrizes pouco aceitáveis. Apesar da popularidade da tatuagem, as reações inflamatórias adversas são comuns e podem apresentar significativo desafio clínico.

Palavras-chave: *tratamento primário; cirurgia plástica; tatuagem.*

INTRODUCTION

The practice of tattooing has been performed for thousands of years, and many agents that cause reactions are present in the components of the colors used.[1] With the increasing prevalence of tattoos throughout the world, more care is needed with adverse reactions to techniques of body modification.[2] The way tattoos are performed has changed over time. In the past, the use of heavy metals was common,[3] while more recently, *azo* dyes are preferred. Green chrome, cobalt-blue, purple manganese, yellow cadmium and red mercury sulfide (cinnabar) have been linked to skin reactions, with the red pigment most commonly causing such reactions.[4] Despite the limited use of pigments containing mercury, reactions to red tattoos continue to occur.

Allergy to the red component of tattoos is a well-known phenomenon, and is related to the cinnabar present in the pigment or in other organic compounds. The allergy can manifest

in various ways, from simple inflammatory reactions to a generalized allergic response.[5-8]

Various treatments may be carried out for the condition, such as laser, excisions, and grafting. The objective of the present study is to review the relevant literature, illustrating with a clinical case treated in a public service department.

METHODS

A literature review related to the management (from diagnosis to treatment) of patients with reactions to red tattoo pigment was carried out. The retrospective study reviewed English and Portuguese language literature on Pubmed and Embase, illustrating with a case report of a patient cared for at the service.

CASE REPORT

A 27-year-old male patient with a presentation of a chronic pruriginous inflammatory lesion in the lateral portion of the left leg, for a duration of six weeks, over a tattoo performed four months before, sought medical care. On examination, lichenified plaques were observed with bruises over the red pigment area (Figure 1). Biopsy was carried out, showing hyperparakeratosis, chronic lichenoid inflammatory infiltrate with perivascular involvement and deposition of pigment in the dermis consistent with lichenoid dermatitis. The patient underwent treatment with topical and oral corticosteroids without resolution of the clinical picture, and was resistant to any surgical procedure. After six months, the patient returned to the service with a worsening of the inflammatory reaction (Figure 2) and underwent resection of the lesion and a full thickness skin grafting (Figure 3). The result after one year has proved satisfactory, with an absence of inflammatory phenomena. (Figure 4)

DISCUSSION

Tattoos have been performed for centuries and are still a common practice in many cultures, being associated with the desire for social inclusion and aesthetic improvement.

Historically, tattoos seem to have arisen as blue marks under the skin, seen in Egyptian mummies. The practice was spread by sailors in China, India, the Far East, and also Europe.[9]

Cutaneous hypersensitivity reactions to tattoo pigments can be classified histologically as granulomatous or lichenoid.[10-14] The etiology of these reactions is still uncertain, however the most widely accepted theory is that of a delayed hypersensitivity reaction, related to the pigment itself or the carrier solution. Scleroderma is an uncommon reaction that can occur in

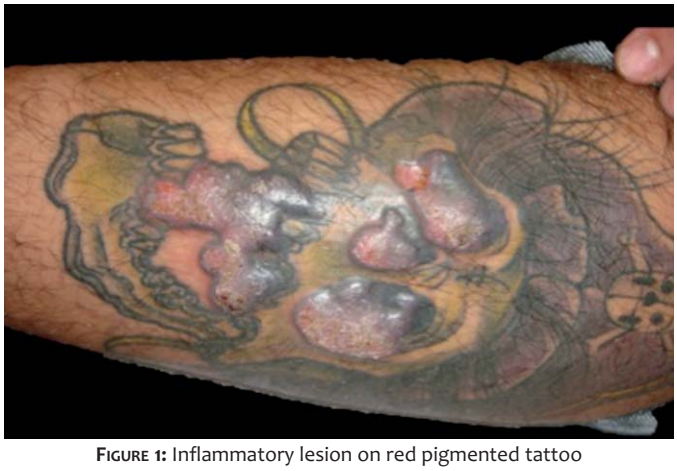

Figure 1: Inflammatory lesion on red pigmented tattoo

Figure 2: Lesion with worsening of the chronic inflammatory reaction, six months after the first medical visit

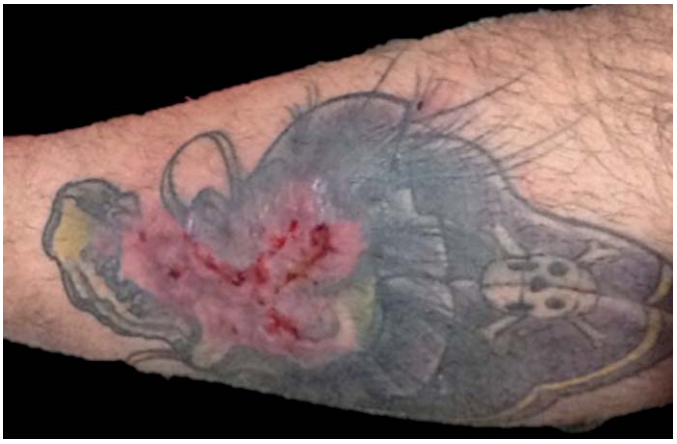

Figure 3: Twentieth post-operative day, with complete tumor removal and skin graft

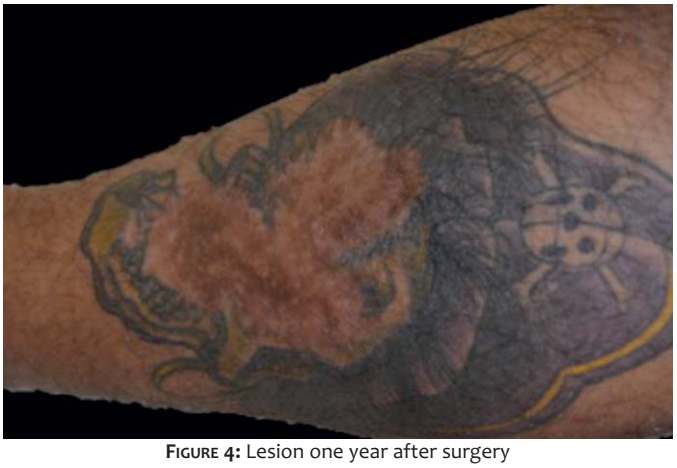

Figure 4: Lesion one year after surgery

tattoos [15] and that complicates a chronic inflammatory reaction to pigments and dyes. [16]

Many pigments can induce allergic responses, including mercury sulfide (red) and cadmium sulfide. Histological studies usually reveal dermal inflammation with pruriginous and nodular alterations and epidermal ulcers, and tissue analysis showing the presence of cadmium. [17-22]

Other skin diseases related to tattoos, such as pyogenic infection, verruca vulgaris, and zygomycosishave been described. Many skin diseases show a predilection for tattooed skin, and can arise as a primary manifestation or even intensify the occurrence of the Koebner phenomenon, as in lichen planus and psoriasis.[23]

The transmission of infectious diseases is certainly of greater significance to public health than the reactions to tattoos described above. Infectious diseases can be local or systemic.[24] Historically, infections such as erysipelas, cellulitis, and gangrene (requiring amputation) by *Staphylococcus sp*. and *Streptococcus sp*. were the most common and alarming infectious complications.[25, 26] The reactions are usually diagnosed shortly after the tattoo has been performed or when it is removed with laser. The lesions characteristic of the disease are symmetrical, erythematous, subcutaneous nodules in the legs. Most evidence suggests Type IV hypersensitivity reaction to various antigens.

There are several forms of treatment for reactions to tattoos, including excision with primary closure and laser treatment.[1,18, 27, 28] Despite the treatment with intralesional or topical steroids, most reactions persist for months or years. Even the use of systemic corticosteroids might not be sufficient to treat the inflammation in progress. Tattoos can be removed through light-based therapies, including several wavelengths. Those therapies are aimed at reducing the visibility of the reaction to the pigment through the induction of its transepidermal elimination, the removal of the macrophages from the pigment, dispersion of the pigment into smaller particles and alteration of the optics, and refractory properties of the particles. Allergic reactions can manifest in various ways—from simple inflammatory reactions to generalized allergic response. [18, 19]

Another treatment option is a CO_2 laser-based ablation in order to induce elimination of the pigment through the skin and thus reduce the pigment load and the allergenic stimuli, limiting the reaction of the tattoo. [25, 26, 28-30] For certain anatomical regions and tattoo pigments, erbium or carbon dioxide laser ablation can be the treatment of choice.[31] In cases such as a red pigment tattoo on the lips, the treatment with carbon dioxide and erbium can be more problematic due to the lack of dermis. For larger lesions, the treatment of choice is excision, which usually requires grafting.

CONCLUSION

Despite the popularity of tattoos, adverse inflammatory reactions are common and may present a significant clinical challenge, both for the correct diagnosis and for choosing the effective treatment. Should the topical or systemic treatment fail, total excision may be the only option. The final aesthetic result can be very unsatisfactory depending on the amount of tissue resected. ●

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Case Reports

Twenty-five year follow-up of a case of lipoid proteinosis

Evolução de caso de Lipoidoproteinose em 25 anos de seguimento

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ABSTRACT

Lipoid proteinosis is a rare, recessive autosomal multisystem genodermatosis characterized by progressive deposition and accumulation of an amorphous hyaline material in the skin and mucous membranes. The present study reports a 25-year follow-up of a patient with the disease and the combination of medical and surgical treatments used—such as protection against sun rays, oral vitamin E, 0.01% retinoic acid, 20% azelaic acid, excision of verrucous lesions, manual dermabrasion with sandpaper, and chemical peels with Jessner's solution and 35% trichloroacetic acid.

Keywords: lipoid proteinosis of Urbach and Wiethe; ambulatory surgical procedures; surgical procedures, minor; clinical evolution.

RESUMO

A Lipoidoproteinose é uma genodermatose autossômica recessiva rara, multissistêmica, caracterizada pelo depósito e acúmulo progressivo de uma substância hialina amorfa na pele e mucosas. Este trabalho relata o acompanhamento de 25 anos de uma paciente portadora da doença e a combinação de tratamentos clínicos e cirúrgicos, como proteção solar, vitamina E oral, ácido retinóico 0,01%, ácido azelaico 20%, exérese de lesões verrucosas, dermoabrasão com lixa d'água e esfoliações químicas com solução de Jessner e ácido tricloroacético a 35%.

Palavras-chave: *proteinose lipóide de Urbach e Wiethe; procedimentos cirúrgicos ambulatórios; procedimentos cirúrgicos menores; evolução clínica.*

INTRODUCTION

Lipoid proteinosis (LP), also known as cutaneous mucosal hyalinosis, is a rare recessive multisystem autosomal genodermatosis, with a high incidence of consanguinity. It is characterized by the progressive deposition and accumulation of an amorphous eosinophilic hyaline substance, of glycolipoprotein constitution, periodic acid and Schiff reagent (PAS) positive in the skin, with upper aerodigestive tract and visceral involvement[1,2] The disease is attributed to mutations resulting in the loss of the extracellular matrix protein's [1] function (ECM1) of 85 kDa, located on the chromosome 1q21. This protein's function is unknown, although it has an important role in the local physiology and homeostasis. [3,4]

It affects both genders equally, with onset in childhood, and is characterized by scarring lesions after minor trauma, and hoarseness. The skin lesions consist of yellowish and ivory color papules, which can be grouped into plaques, located especially

on the face, neck, and areas of friction. In the latter it may still appear in the form of nodular lesions.[1,3,4] The pharyngeal and oral mucosa presents with diffuse infiltration and a yellowish-white color, a stiffened tongue, culminating with dysphonia (and hoarseness since birth), with those symptoms often being the first manifestation of the disease. In more severe cases, the diffuse infiltration of the pharynx and larynx can cause respiratory distress, sometimes requiring tracheotomy. Infiltration of the genital mucosa may occur. [3-5]

The systemic-visceral lesions are characterized by orthodontic abnormalities, intracranial calcifications, epilepsy attacks, pigmentary disorders, diabetes mellitus and porphyria. LP has an insidious, chronic, and benign course, not yet having effective treatment.[6-10]

The objective of the present study is to describe the follow-up of a female patient duringa twenty-five year development, highlighting the importance of dermatologic surgery to improve the quality of life forthose patients.

CASE REPORT

Twenty-eight-year-old Caucasian female patient, born in the state of São Paulo - Brazil, with a history of parental consanguinity (parents are cousins).

Since the age of two, the patient has had dysphonia and hoarseness associated with skin lesions on the face and limbs, which developed intoblisters, would increased in size and burst, leaving crusts, and erythematous and hypopigmented macules as sequelae. The lesions emerged in outbreaks every six months, with worsening after traumas. At six years of age, there was an appearance of ulcers and nodular lesions on the elbows and forearms. Dermatological examination revealed lesions on the face, some crusty and other hypochromic scarring, and still others depressed hyperchromic, with varicelliform appearance and dimensions ranging from punctate to lenticular. (Figure 1) In the infraorbital region there were small yellowish papules. Elbows and forearms had nodules, exulcerated lesions and areas of thickening bilaterally. Histological examination at six years of age showed an epidermis with hyperkeratosis and papillomatosis, and papillary dermis with accumulation of a pink fibrillar substance around vessels and sweat glands, and atrophy. This substance is PAS positive and diastase resistant. (Figure 2)

Otorhinolaryngologic examination six years of age showed an infiltrated, irregular, and rigid lingual surface with yellowish plaques, (Figure 1) nasal septa with hypertrophied turbinates, thickened pharynx and epiglottis, and vocal cords with normal sensitivity and signs of thickening. Skull MRI showed two images with calcium densities laterally to the cavernous sinus, with symmetrical arrangement and cranial projection. The patient was referred to the neurology service for evaluation and treatment of epileptic seizures.

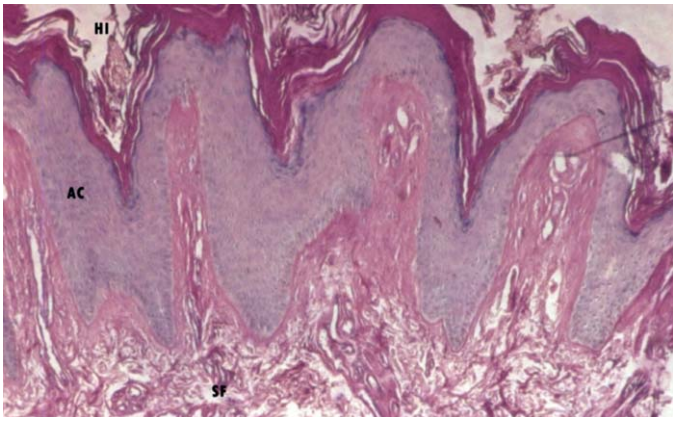

Figure 2: PAS (40x): Epidermis with hyperkeratosis (HI), acanthosis with papilomatosis (AC) and accumulation of pink fibrillar substance in the papillary dermis (FS) around vessels and sweat glands

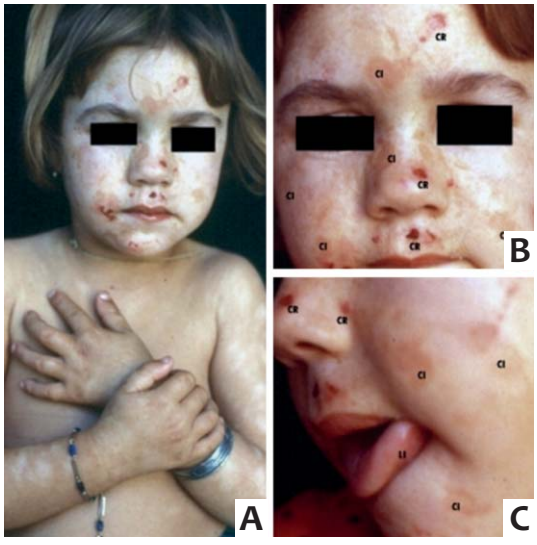

Figure 1: A - Crusty and cicatriacial lesions in the face; **B** - and **C** - Detail of crusty lesions (CR) and atrophic scars (CI), erythematous scars and scars with alterations in the pigmentation; tongue infiltration with whitish plaques

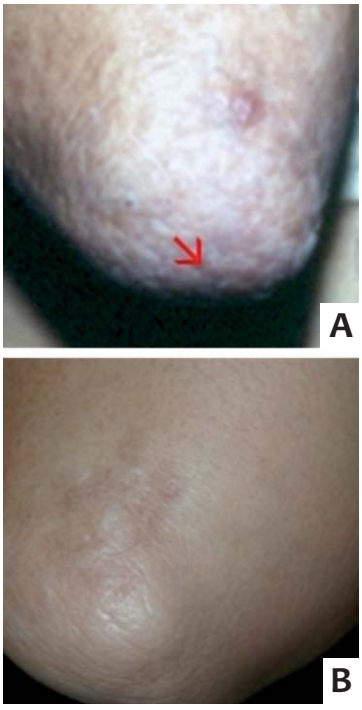

Figure 3: A. Elbow at 13 years of age, before surgical treatment, with isolated and confluent papules forming a plaque and thickened skin (red arrow); **B.** At 28 years of age without the papulous lesions and with permanence of the improvements in color and thickness.

Table 1: Timeline of procedures performed

MEDICATION OR PROCEDURE	AGE OF USE OR WHEN THE PROCEDURE WAS PERFORMED	PURPOSE OF THE USE OR OF THE PROCEDURE CARRIED OUT
SOLAR PROTECTION	Throughout the period	Prevention of residual hyperpigmentation.
ORAL VITAMIN E	Throughout the period	Prevention and improvement of skin damage caused by any free radicals - antioxidant action.
TOPIC FIBRINOLYTIC	When the lesions were crusty	Elimination of crusts and possible necrotic tissues.
0.01% RETINOIC ACID	Throughout the period	Cellular regeneration, exfoliations and neocollagenesis.
20% AZELAIC ACID	Throughout the period	Whitening properties.
SURGICAL EXCISION AND ELECTROCAUTERIZATION	At 13 years of age	Surgical Removal of papular, nodular and verrucous lesions.
DERMABRASION WITH SANDPAPER180	At 14 years of age	Standardization of the region, with decrease in skin thic kening and improvement of the yellowish color.
JESSNER'S PEELING AND 35% TRICHLOROACETIC ACID	At 14, 15, 16, and 20 years of age	Standardization of the region, with decrease in skin thic kening and improvement of the yellowish color of the skin.

Skin lesions were approached with clinical treatment and surgical procedures. (Table 1) Clinically, there was the introduction of sunscreens with chemical filters and SPFs between 30 and 50, oral vitamin E, fibrinolytic topical cream up to three times daily in the presence of crusty lesions, 0.01% retinoic acid cream at night and 20% azelaic acid cream in the morning before applying sunscreen. Surgically, electrocautery and surgical excision of nodular and verrucous lesions were carried out in the lower and upper eyelids, and elbows (Figure 3); dermabrasion with sandpaper number 180 preceded by local anesthesia with 2% lidocaine was performed in the frontal region, medium chemical peel with Jessner solution and 35% trichloroacetic acid was applied on the whole face, with improvement in the skin-thickening and the yellowish color of the skin. (Figure 4)

Currently, at 28 years of age, only shallow scarring lesions can be seen, with a subtle continuation of the varicelliform aspect, interspersed with skin of normal color in the mid-facial and frontal regions. In the infraorbital region there was an almost complete disappearance of the small yellowish papules. (Figure 5) Three years before, the patient developed diffuse non-scarring alopecia, dysphagia, and dyspaurenia, with the dermatological appearance remaining stable and no new occurrence of lesions. The patient, however, presents resistance to the treatment of seizures and a persistence of dysphonia, hoarseness, and infiltration and hardening of the lingual surface.

DISCUSSION

LP is an extremely rare, recessive autosomal disease, commonly associated with consanguinity, with approximately 300 cases described in the literature, with the highest prevalence in Sweden and South Africa. [10] In the case ofthe present study, the authors observed the patient's cutaneous appearance with infiltrated skin of yellowish color, similar to the color of ivory, in the face, neck, hands, knees, and elbows. Skin lesions manifested in various developmental stages: papulous, nodular, keratotic, and verrucous, leading to the formation of varicelliform scars. These have as worsening factors, mechanical trauma and exposure to the sun. The alterations in the skin of the eyelids is called "Moniliform Blepharosis". [10] The mucosal condition was char-

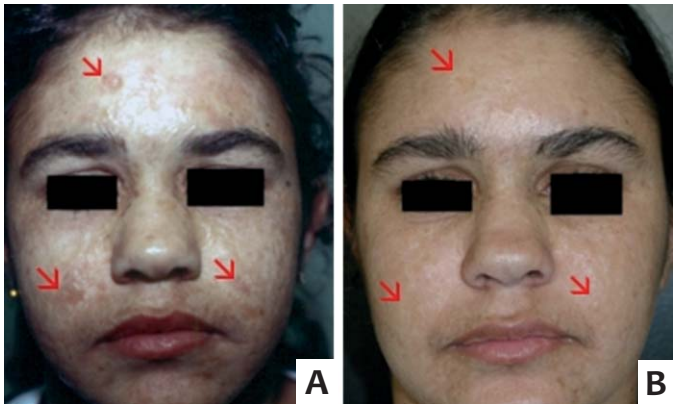

Figure 4: A. Face at 13 years of age, before surgical treatment, showing yellowish color, atrophic and pigmented scars (red arrows); **B.** At 28 years of age, with permanence of the improvement in the yellowish color, skin thickness, atrophic scars, and pigmentation (red arrows)

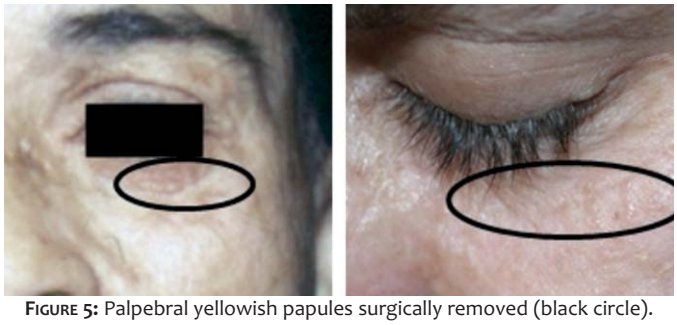

Figure 5: Palpebral yellowish papules surgically removed (black circle). To the left, at 13 years of age and to the right at 28 years of age, without the emergence of new lesions.

acterized by dysphonia and hoarseness from birth, yellow-white infiltrated plaques on the lips, tongue, pharynx, and tongue, and a stiffened tongue with impaired mobility. Systemic manifestations that may be present and have been observed in patients were alopecia, hypohidrosis, nail and tooth abnormalities, intracranial calcifications, and epilepsy, the last two treated by a Neurologist. [1,5]

LP usually has a chronic and benign course, requiring ambulatory monitoring and support for life, for there is no known effective treatment.[2,10] Clinical therapeutic options include: oral retinoids or D-penicillamine [8-10] and surgical therapy consisting of dermabrasion, chemical exfoliation, or 10,600nm CO_2 laser.[6,7] The use of surgical dermabrasion with sandpaper number 180 and chemical exfoliations with Jessner's solution and 35% trichloroacetic acid, showed similar results to those in the researched literature. The use of a topical retinoid during the entire period enables cell regeneration, constant exfoliation, and synthesis of new collagen, bringing benefits to the final cosmetic result.

In the present case report, the clinical and surgical treatments used in the patient during the 25-year follow-up showed satisfactory results for the control of dermatological signs such as scar lesions on the face, infraorbital region, and upper and lower eyelids, with significant improvement in the appearance and, more markedly, of her quality of life. As the lesions are not prone to natural involution, the choice for surgical therapy is mandatory to eliminate papular, nodular, and vegetating lesions, as well as the use of dermabrasion and chemical exfoliations for the improvement of the skin thickening and yellowish color.

The present study is aimed at highlighting that, even with the absence of a definitive and effective treatment described in the researched literature, clinical and surgical procedures should be encouraged in the management of patients bearing LP. Given that the clinical profile has an onset in childhood or early adolescence, procedures should be performed progressively, with the use of the available therapeutic armamentarium according to the appropriate indications, aiming at improving the dermatological signs. [6-10] In this manner, it is possible to prevent the origin of certain stigmas that affect the quality of life of patients. ●

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Case Reports

Onychomatricoma, a rare tumor of the nail apparatus: report of three cases

Onicomatricoma: Tumor raro do aparelho ungueal – Relato de três casos

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ABSTRACT

Onychomatricomas are rare benign tumors originating from the nail matrix and underlying stroma. They are usually asymptomatic and slow growing, affecting both middle-aged men and women, and more frequently involve the digits of the hands. Key clinical features for diagnosis are: yellowish longitudinal band of variable width, splinter hemorrhages, longitudinal grooves associated with the transverse overcurvature and fingerlike projections emerging from the nail matrix. The authors report three cases of this tumor affecting toes, emphasizing main clinical aspects, dermoscopic findings, and surgical treatment.

Keywords: nails; nails, malformed; neoplasms.

RESUMO

Os onicomatricomas são tumores benignos raros que se originam a partir da matriz ungueal e do estroma subjacente. São geralmente assintomáticos e de crescimento lento. Acometem igualmente homens e mulheres de meia idade, comprometendo com maior frequência os dígitos das mãos. As características clínicas fundamentais para o diagnóstico são: faixa longitudinal amarelada de espessura variável, estilhaços hemorrágicos, estrias longitudinais associadas à hipercurvatura transversal e projeções digitiformes emergentes da matriz ungueal. Os autores relatam três casos desse tumor acometendo pododáctilos, enfatizando seus principais aspectos clínicos, achados dermatoscópicos e tratamento cirúrgico.

Palavras-chave: *unhas; unhas malformadas; neoplasias.*

INTRODUCTION

Onychomatricoma (OM) is a rare benign tumor that originates from the nail matrix and the underlying stroma.[1,2] It was first described by Baran and Kint in 1992.[3] Since its first description a few more than 40 cases have been reported in the international literature.[4]

OM affects middle-aged men and women evenly and is more prevalent in Caucasians.[4-6] It is the only nail tumor in which the alteration of the nail plate is actively produced by the lesion.[6] Although its etiology is not yet understood, history of trauma is referred as a predisposing factor.[1,4]

The picture is usually asymptomatic, however there are four key clinical features for the diagnosis: presence of a yellowish longitudinal stripe of variable thickness; splinter hemorrhages involving the proximal portion of the nail plate; longitudinal grooves associated with the transverse hypercurvature; and fingerlike projections emerging from the matrix—the latter being responsible for the production of small cavitations observed from the free border of the nail plate. [1, 2, 4, 6]

The present study reports three OM cases, emphasizing the main clinical aspects, dermoscopic findings, and surgical treatment.

CASE REPORTS

Case 1: A fifty-three-year-old Caucasian man referred for thickening of the nail of the right hallux for the preceding five years. On examination, the nail plate was perceived to be thick-

ened and of chestnut brown color in its medial portion (Figures 1A and B). The nail plate was removed, and a chestnut grayish homogeneous mass could be observed in the matrix region. The lesion was surgically excised (Figure 1C), and the histology revealed features of OM. There was no recurrence six months after the surgery. (Figure 1D)

The nail plate had a hard consistency and presented cavitations in its proximal portion. (Figures 1E and F)

Case 2: A forty-two-year-old Caucasian woman presented with a thickening of the nail of the left hallux for ten years, with an absence of associated symptoms. Upon examination it presented with a thickened and yellowish nail with splinter hemorrhages (Figure 2). Surgery with avulsion of the nail plate was carried out (Figure 3A). The nail plate had cavitations in its proximal portion (Figure 3B) and had coupled with the tumor through fingerlike projections in the matrix (Figure 3C), which was excised (Figure 3D). Anatomical pathology confirmed the OM diagnosis. There was no recurrence after six months, and nail growth took place without sequelae.

Case 3: A fifty-five year-old Caucasian woman complained of asymptomatic thickening of the nail plate of the left third toe for two years. Upon examination, thickened, yellowish nails were observed, with longitudinal grooves and transverse hypercurvature (Figure 4A). Dermoscopy evidenced whitish striae and splinter hemorrhages (Figure 4B); whitish circular images (Figure 4C) were identified in the frontal view.

Avulsion of the nail plate was carried out (Figure 4D) and after its elevation a tumor with fingerlike projections in the area of the matrix was observed (Figure 4E). The complete excision of the lesion (Figure 4F) was performed. Dermoscopy of the nail plate showed small cavitations involving the proximal portion (Figure 4G). Histopathology was compatible with OM (Figure 4H). Six months after treatment there was no recurrence of the tumor, however the patient developed nail pterygium (Figure 4I).

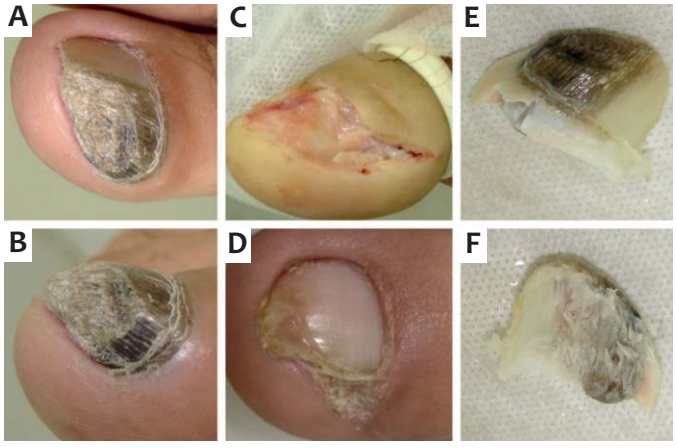

Figure 1: A) Nail plate with longitudinal chestnut brown color and thickening in its medial portion. **B)** Lateral view of alterations of the nail plate. **C)** Complete surgical exeresis of the lesion and part of the nail matrix. **D)** Outcome after six months. **E)** Nail plate. **F)** Fingerlike impressions in the portion of the nail plate that is in contact with the tumor.

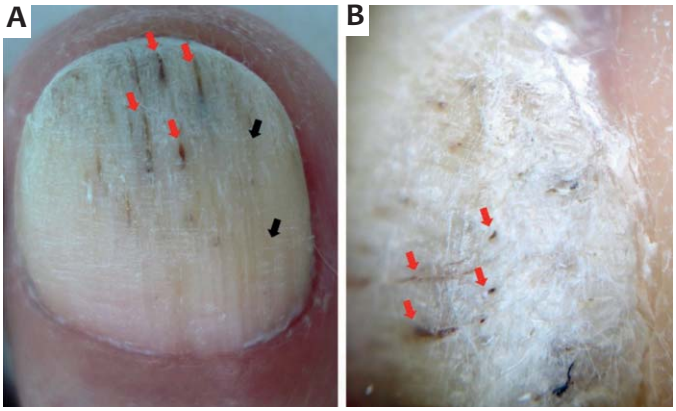

Figure 2: A) Thickened nail plate with longitudinal grooves (black arrows) and splinter hemorrhages (red arrows). **B)** Dermoscopy of the nail plate showing splinter hemorrhages (red arrows)

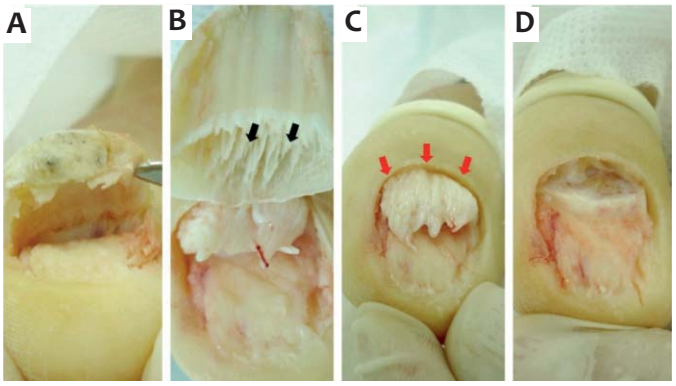

Figure 3: A) Avulsion of the nail plate. **B)** Cavitations involving the proximal portion of the nail plate. **C)** Tumor with fingerlike projections emerging from the nail matrix. **D)** Surgical exeresis of the tumor and of part of the matrix.

DISCUSSION

OM is usually asymptomatic and most patients only seek medical care many years after its emergence.[4,6]

In the reported cases, the patients had no associated symptoms, and the main complaint was the thickening of the nail plate. That fact can be explained by the slow growth inherent to the tumor. Studies on markers cannot distinguish whether the OM is a tumor or a reactive lesion, although it has been suggested that it can be a hamartoma of epithelial and connective tissue mimicking matrix structures.[3] Trauma history was not mentioned in any of the cases, and as described in the literature, the etiology remains obscure. [3, 5, 6]

The tumor is more common in middle-aged Caucasians,[5-8] as in the cases reported. Although descriptions of involvement of the fingers are more common than those involving toes,[8] all reported cases had involvement of toenails—two of them in the hallux and one in the third toe.

The four main clinical features in the diagnosis might have variable expression in cases where the color alteration of the nail is more exuberant—such as in Case 1—and others

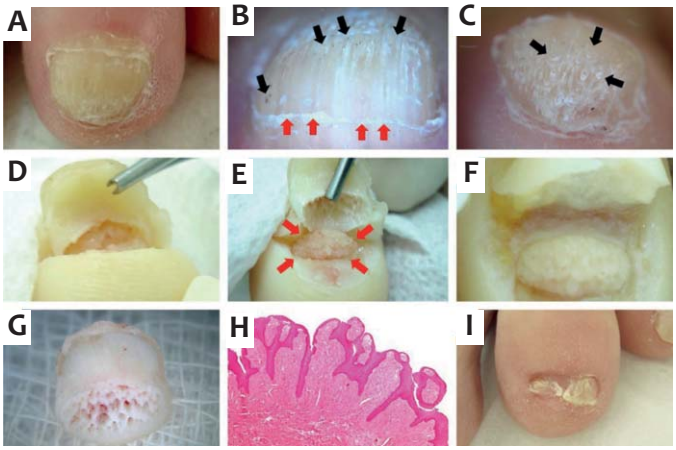

Figure 4: A) Thickened nail plate with yellowish color. **B)** Dermoscopy showing longitudinal striae (red arrows) and splinter hemorrhages (black arrows). **C)** Frontal view from dermoscopy, evidencing whitish circular images (black arrows). **D)** Avulsion of the nail plate from the distal border. **E)** Tumor with fingerlike projections in the region of the matrix (red arrows). **F)** Surgical exeresis of the tumor and of part of the matrix. **G)** Nail plate dermoscopy showing small cavitations in its distal border, produced by the tumor's fingerlike projections. **H)** Anatomical pathological examination (Hematoxylin-Eosin, 40X): papillomatous epithelial hyperplasia and stromal fibroblast proliferation compatible with OM. I) Nail pterygium

where the diffuse thickening of the nail and the presence of splinter hemorrhages are more evident—such as in Cases 2 and 3. The fourth typical characteristic of the tumor, which corresponds to finger-like projections emerging from the matrix, can only be examined during surgery. [3, 6]

Dermoscopy assists in the visualization of splinter hemorrhages in the proximal portion of the nail plate and longitudinal whitish grooves, the latter corresponding to the channels of the nail plate. [2, 6] A frontal view of the nail plate can also show circular whitish areas, some with bleeding fragmentsembedded within, as shown in Case 3.

The bioposy of the lesion is crucial for a definitive diagnosis, which is histological. OM is a fibroepithelial tumor composed of two distinct parts. The proximal zone is characterized by deep epithelial invaginations and fibrillary and fibrotic stroma; the distal zone has multiple digitations along its axis. Immunohistochemistry is of great diagnostic aid. The AE1/AE3 antibody is a potential marker for OM. There is also a diffuse expression of CD34, whereas CD99 markers, S-100 protein, epithelial membrane antigen, actin, and desmin are negative. [5, 7, 8]

Among the complementary tests, ultrasound is useful for observing the tumor in the matrix area, beneath the proximal nail fold. If performed in the nail plate region, it is not instructive due to the thickening of the nail plateforming an acoustic shadow, which hampers the identification of the tumor. On the other hand, MRI can yield information both relative to the matrix and the nail plate. [4] Another recently described diagnostic method suggests the clipping of the distal part of the nail and anatomical pathological examination. [9] Nevertheless, in most cases the clinical and dermoscopic examinations, associated with anatomical pathological examination, are sufficient for diagnostic clarification, as in the cases reported in the present study in which no complementary examinations were required.

The differential diagnosis should be carried out with squamous cell carcinoma, verruca vulgaris, keratoacanthoma, fibrokeratoma, Bowen's disease, fungal, and bacterial infections. There are also atypical cases described as a verrucous surface tumor located in the lateral nail fold, total onychodystrophy and a variation of the pseudo-fibrokeratoma type. [2, 4, 5]

In the face of a suspected diagnosis, patients should undergo avulsion of the nail plate for matrix analysis. [3, 10] It is worth noting that in the three cases described, the nail plate hada hard consistency, making handling difficult during surgery. In all cases tumors with fingerlike projections in the matrix could be observed, which were responsible for the formation of small cavitations observed in the free border of the nail plate. [1, 3, 4]

The long-term prognosis is favorable, and growth of the nail can occur later without defects. Some patients, however, develop onychodystrophy. [10] Six months after the surgery, patients were reassessed with no evidence of tumor recurrence. Nevertheless, only in Case 2 did the growth of the nail plate occur without sequelae.

The authors can conclude that, despite the rarity of this condition, early diagnosis is key for optimal treatment. It is important to note that the clinical presentation might not present all the typical characteristics of the tumor, and there may be variations among the cases. The authors call attention to the circular whitish areas that contain splinter hemorrhages —visualized during dermoscopy and observed in one of the cases reported—as well as to the hard consistency of the nail plate found during surgery in all cases described. ●

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Pigmented eccrine poroma simulating malignant melanoma

Poroma écrino pigmentado simulando melanoma maligno

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ABSTRACT

Eccrine poroma is a benign tumor that occurs in eccrine or apocrine sweat glands. It is a solitary lesion, usually the same color as the skin and located on the palms and soles. The authors report a clinical case of pigmented eccrine poroma, in light of its rare and atypical clinical presentation of the tumor, which in this case simulates a malignant melanoma.
Keywords: poroma; sweat gland neoplasms; melanoma.

RESUMO

O poroma écrino é tumor benigno de glândula sudorípara écrina ou apócrina. Trata-se de lesão solitária, geralmente cor da pele, localizada em palmas e plantas. Relatamos caso clínico de poroma écrino pigmentado, pela apresentação clínica rara e atípica do tumor, simulando melanoma maligno.
Palavras-chave: *poroma; neoplasias das glândulas sudoríparas; melanoma.*

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INTRODUCTION

Eccrine poroma is a benign tumor of the eccrine or apocrine sweat gland that is composed of cells similar to those of the acrosyringium. It is characterized by a monochrome skin lesion, usually located on the palms and soles and possibly affecting other body areas.[1-3] There are clinical variants, which include poromatosis, linear eccrine poroma and pigmented eccrine poroma.[4] The pigmented variant is rare and can have a possible clinical resemblance to nodular malignant melanoma, due to the pigmentation of the lesion. Due to the fact that the clinical features of the poroma are not specific, it is important to perform a differential diagnosis against pyogenic granuloma, pigmented basal cell carcinoma, hemangioma, and melanoma, with the definitive diagnosis established by histology[1,5] The present study reports the clinical case of a pigmented eccrine poroma in an unusual location for the tumor, simulating a malignant melanoma.

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CASE REPORT

A 53-year-old female patient with brown pigmented skin, referred for the appearance of a nodule on the anterior region of the left thigh, beginning eight years before. Initially, it emerged as a skin color nodule that evolved into a reddish color, becoming darker later on. The patient described a progressive enlargement of the lesion, associated with mild local pain. During this period, the patient sought the care of a dermatologist due to the presence of the blackened nodulationon the left thigh. Diagnoses of a skin tumor (pigmented basal cell carcinoma or malignant melanoma) and of a nodule caused by a thrombosed vein have been suggested. The patient had a history of hypertension, diabetes, dyslipidemia and treated breast cancer. Dermatological examination showed a blackened nodulation with a firm and hardened consistency, with areas of exulceration, measuring approximately 2cm in its largest diameter, located on the anterior region of the left thigh (Figures 1 and 2).

Under dermoscopic examination, the lesion showed features highly suggestive of malignant melanoma. A decision was made for diagnosis with surgical treatment. The patient underwent exeresis of the lesion, with the specimen sent for anatomical pathological examination. Histology showed poroid cells with pigmented cytoplasm (P) and structures similar to those of acrosyringium (arrow) (Figures 3 and 4). The histological examination was consistent with the diagnosis of pigmented eccrine poroma, with the clinical hypothesis of malignant melanoma being discarded. The patient is being followed-upwith at an ambulatory clinic, with good clinical outcome. There has been no recurrence of the lesion.

DISCUSSION

Eccrine poroma was first described by Pinkus et al. in 1956, whoderived the tumor's denomination from the sudoriparous duct. [2,6] Ackerman histologically defines a group of four

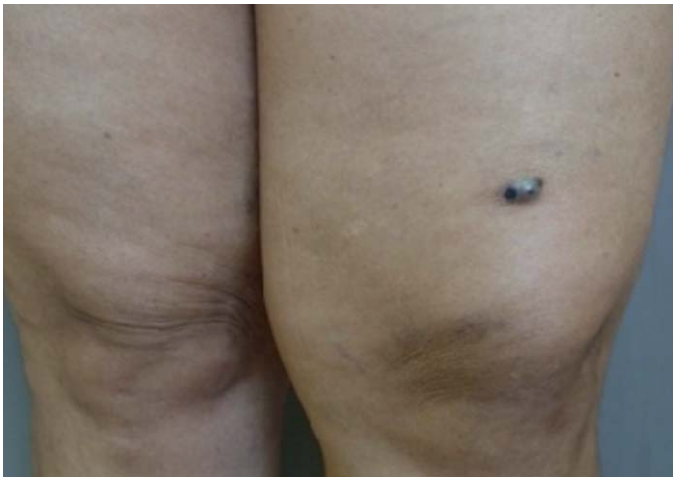

Figure 1: Blackened nodulation of about 2cm in largest diameter with a firm and hardened consistency, with areas of exulceration, in the left thigh

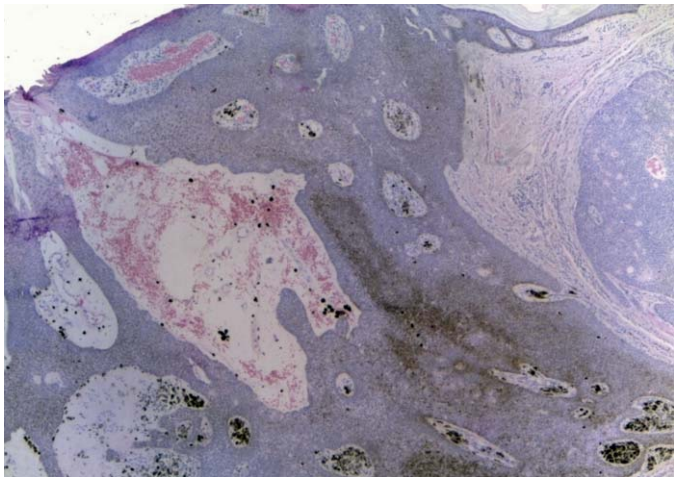

Figure 3: HE 100X. Eccrine poroma

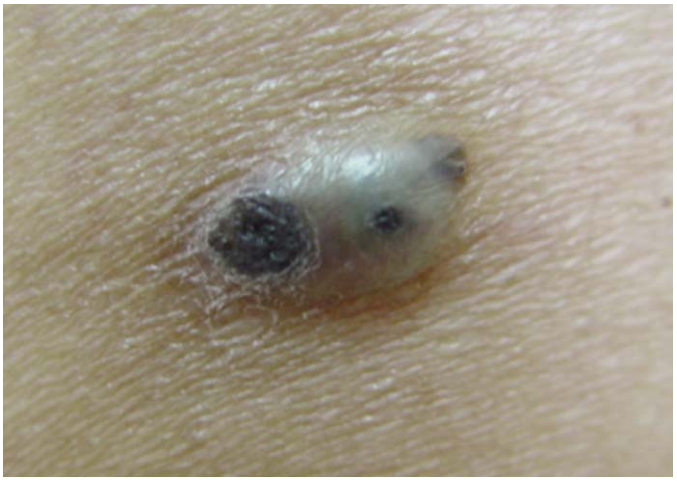

Figure 2: Lesion detail in the left thigh

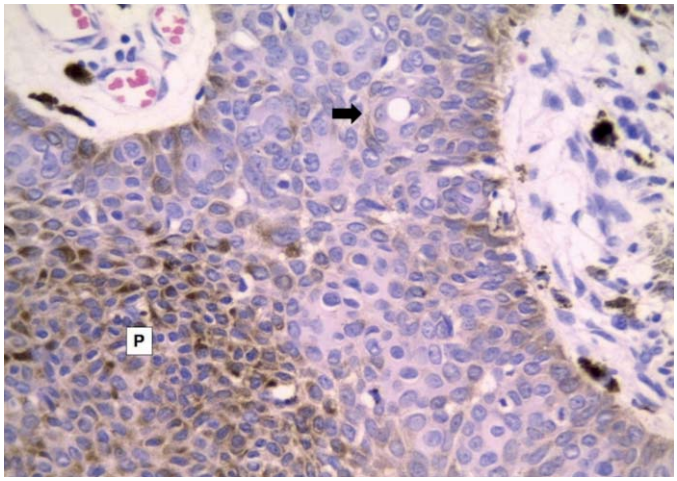

Figure 4: HE 400X. Poroid cells with pigmented cytoplasm (P) and structures similar to those of the acrosyringium (arrow)

benign epithelial neoplasms composed of cells similar to those of the intradermal eccrine duct, the acrosyringium: hidroacanthoma simplex, eccrineporoma, dermal duct tumor and poroid hidradenoma—all being histopathologically classified based on their location relative to the epidermis. [1, 4, 7]

The term poroma refers to a group of rare cutaneous adnexal tumors, composed by cells (cuticular and poroid) similar to those of the acrosyringium. [1, 2, 7] Eccrine poroma is a benign tumor of the eccrine or apocrine sweat gland. [1] It commonly occurs as nodules, or a sessile or pedunculate solitary papule the color of the skin. [1, 3, 4] There are clinical variants that include poromatosis, linear eccrine poroma and pigmented eccrine poroma. [4, 6, 7] It can sometimes be pigmented, with a bright red or violet color, being pruriginous or painful.

It affects individuals of different races, especially Caucasians between the ages of 40 and 60 years. [2] It affects both genders equally, with a slight predominance in men. The progression of the lesion may vary from weeks to years. [6] It rarely precedes the development of porocarcinoma. Usually located on the soles or palms, it can affect other body areas. [4, 5, 8] It can also ulcerate on pressure points and areas of trauma, in general showing slow and asymptomatic growth. [2, 6]

The pigmented variety of eccrine poroma occurs by persistence of melanocytes in the acrosyringium, with absence of a known cause. [8] Typically, in the acrosyringium, during the embryonic stage there is a presence of melanocytes, which recede at the end of thatphase. [6] With the improvement in the diagnostic accuracy of dermatoscopy examinations for the various types of skin tumors, some lesions can be identified prior to histological examination. [7] Dermoscopy is a non-invasive examination, useful in the diagnosis of pigmented skin lesions. It helps in the early diagnosis of malignant melanoma lesions, allows for the differentiation of pigmented benign and malignant lesions from malignant melanoma, and is useful in the diagnosis of pigmented basal cell carcinoma. Although there are several dermoscopic studies of pigmented lesions, there are not many studies regarding eccrine poroma in its pigmented variety. [9]

Pigmented eccrine poroma can clinically simulate various skin lesions, including pigmented basal cell carcinoma, seborrheic keratosis and malignant melanoma, due to its clinical, dermoscopic, and histologic variety. [7, 10] Various types of dermoscopic structures associated with melanocytic and non-melanocytic lesions are observed in pigmented poromas due to varying amounts of melanin in those lesions—which makes it clinically and dermoscopically indistinguishable from melanoma and, in some cases, from non-melanoma skin tumors. [7]

Histologically, eccrine poroma reveals aggregates of uniform basaloid cells, which can irradiate from the basal layer of the epidermis to the dermis. [3, 5]

Due to its being a benign lesion, eccrine poroma has a good prognosis. The treatment of choice is complete surgical excision. The recurrence of the lesion is uncommon. [2, 4, 6]

Due to its pigmentation, the pigmented eccrine poroma may in some occasions clinically simulate a malignant melanoma. $_6$ It is important to highlight that the clinical features of eccrine poroma are not specific and may clinically resemble other skin tumors. Pyogenic granuloma, hemangioma, basal cell carcinoma, nodular melanoma and amelanotic melanoma can be cited among differential diagnoses, with histological examination being required to confirm the diagnosis. [1, 5-7]

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