Chemical Peelings in the Periorbital Region

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Introduction

The eye region is the first facial region to show signs of aging, which can make successful Periorbital Rejuvenation (POR) very rewarding to both patient and physician. Periorbital hyperpigmentation (POH) can make a patient look older and more fatigued, and should be taken into consideration with POR [1–3]. POH is a complex condition which is challenging to treat and requires long-term maintenance. These two very common aesthetic conditions can dramatically affect a person's face, whether male or female. Treatment options are as numerous as the anatomic and causative variables involved. The treating physician needs to have a detailed understanding of facial anatomy to properly diagnose the underlying cause and treat accordingly.

Periorbital Rejuvenation

Background

Periorbital aging is variable, based on individual or familial anatomic features involving bone (resorption), fat (pseudo-herniation), muscle (laxity, heaviness, motility) and cutaneous tissue (wrinkles, elastosis). Successful outcomes with chemical peeling depend on understanding these structural variables, since a multimodal approach is commonly needed to rejuvenate this area. Treatment options include surgical blepharoplasty, neuromodulators, dermal fillers, lasers, topical agents and chemical peeling agents of varied strengths (Table 6.1). Peels can tighten the anterior lamella in younger patients with only textural changes or mild fat protrusion [4].

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A. Badawi (ed.), *Periorbital Rejuvenation*,
https://doi.org/10.1007/978-3-030-46866-8_6

Table 6.1 Comparison of treatment options for POR

Anatomic feature	Surgical/injectable treatment	Chemical peel
Mild skin laxity/ hooding without fat herniation	Pinch blepharoplasty or micropunch blepharopeeling	Hetter peel 0.1–0.4% CO
Heavy eyelids with pseudo-fat herniation	Upper or lower (transconjunctival) blepharoplasty	Hetter peel (done with or after blepharoplasty)
Hollowed tear trough	Dermal fillers	Superficial peels or low fluence erbium
Crow's feet	Neuromodulators/dermal fillers	Hetter peel (in conjunction with neuromodulators/fillers)

Role of Chemical Peels in Periorbital Rejuvenation

Classification

Chemical peels are classified by the depth of injury produced [4, 5]. Superficial peels will not improve tissue laxity, but can improve skin tones. If skin tightening is desired, then achieving a medium-depth peel is necessary. Peels using 35% trichloroacetic acid (TCA)—alone or preceded by dry ice, Jessner's solution, or 70% unbuffered glycolic acid—are effective for achieving these medium-depth peels and can be repeated in 3 month increments for additive effect [5]. More significant tissue laxity, with or without pseudo-herniation of fat pads, requires surgical (blepharoplasty) or chemical tightening of the anterior lamella. Phenol-croton oil peels are one of the most effective chemical treatment options in this case [6].

History

In 2000, the plastic surgeon Greg Hetter published a landmark set of articles analyzing all known phenol-croton oil peel formulas [7–10]. His quest was to find the active ingredient in these formulas. In these articles, Hetter disproved the common dogma being taught, namely that croton oil was diluting the phenol. Instead, he found the peel solution became stronger as the concentration of croton oil was increased. Furthermore, he devised a progressive croton oil table denoting where low concentrations could be used in thin skin areas like the eyelids and neck, and higher concentrations in thicker skin areas like the upper lip [10].

Segmental Peeling

Segmental phenol-croton oil peels are simpler to learn and perform than full face peels (Figs. 6.1, 6.2, and 6.3) [11, 12]. In skin types I–III, the periorbital skin can be peeled with a very low risk of pigmentary complications like PIH. Patients may experience temporary dyschromia which evens out over several months or at most 2 years [12, 13]. Sun-tanning must be avoided to reduce the severity and longevity of this dyschromia. Skin type IV can be peeled, but the smallest area possible should be treated within the cosmetic unit, such as the upper eyelid skin between the pretarsal skin and the lower margin of the brow. In general, skin types IV and darker will respond better to surgical and dermal filler options [14].

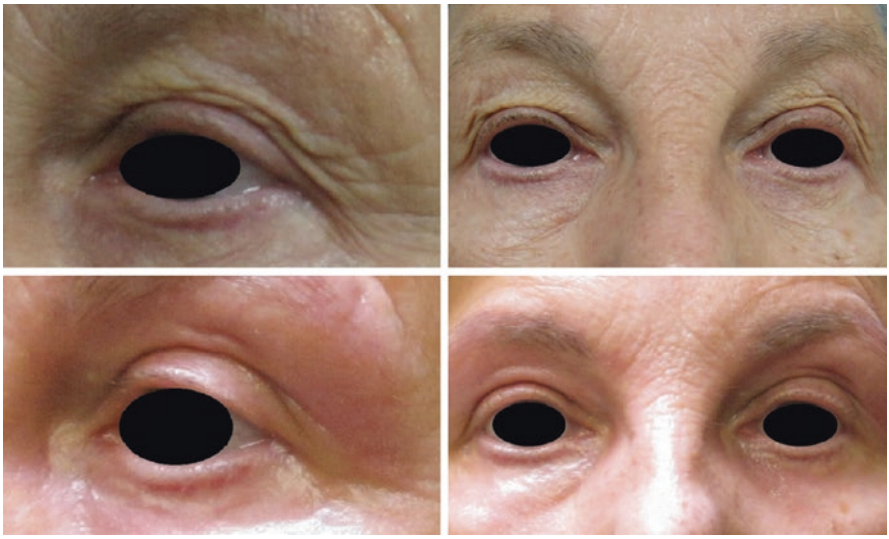

Fig. 6.1 Before treatment and 3 months post-Hetter VL (0.1% croton oil)

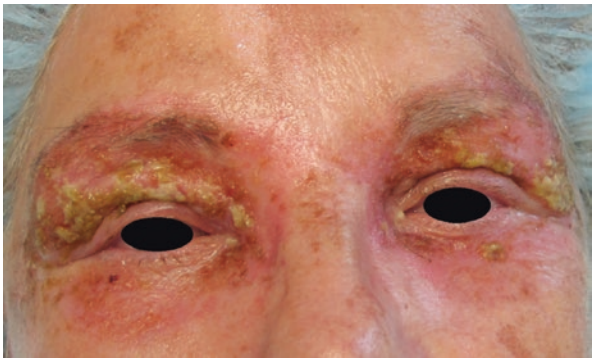

Fig. 6.2 3 days post-Hetter VL (0.1% croton oil)

Fig. 6.3 Patient shows lasting results 2 years post-Hetter VL (01.% croton oil)

Technique

Most phenol peel experts agree that variations in application technique can affect the depth of the peel, regardless of croton oil concentration [6]. Therefore, it is essential to identify certain clinical endpoints. The trained physician needs to recognize these key visual indicators: a thin, transparent frost with a pinkish background indicates a peel to the papillary dermis, while a solid, thick, organized frost shows the peel has penetrated to the upper to mid reticular dermis [13]. For peeling the lower lid, the solution should reach the edge of the ciliary margin [12, 13]. Regular or milia Q-tips can be used to apply the solution. Care should be given to the wetness of the applicator and the number of passes being done. Although these are weak concentrations, the thin eyelid skin will frost as expected. The upper eyelids typically respond best to the Very Light 0.1% croton oil solution (Table 6.2). Usually the upper lids are only peeled to the tarsal fold. Most importantly, the success of this peel in correcting laxity depends on treating patients without heavy eyelids and without pseudo-fat herniation (Figs. 6.4 and 6.5).

In darker skin types, the peel should be contained within the borders of the orbital rim. This area of skin responds well to treatment and can easily be camouflaged by makeup or glasses during recovery [13]. The peel is done slowly, under local anesthesia [5]. Recovery typically takes 6–7 days. For a shorter recovery time, a series of lighter peels can be done over time [13].

Table 6.2 Hetter's phenol-croton oil formulas for thin skin areas [10]

Medium Light (0.35% croton oil)	
Phenol 88%	4 cc
Water	6 cc
Septisol[a]	16 gtts
Croton oil	1 gtt
Very light (0.1% croton oil)	
Phenol 88%	2 cc
Water	5 cc
Medium light formula	3 cc

[a]Septisol is a trademark of Steris Corp (Mentor, OH)

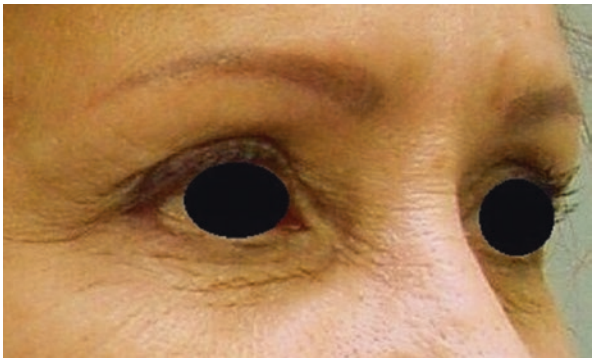

Fig. 6.4 Before upper and lower lid Hetter VL (0.1% croton oil)

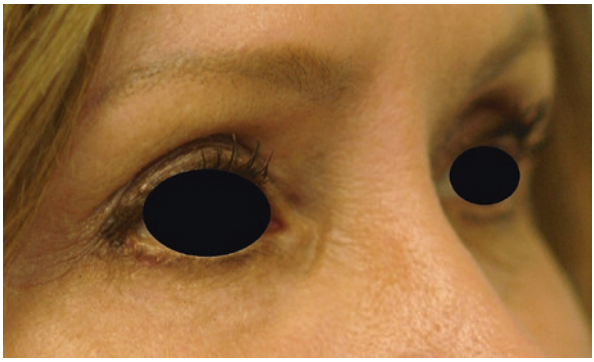

Fig. 6.5 After upper and lower lid Hetter VL

Fig. 6.6 Before micropunch skin removal and Hetter ML (0.35% croton oil)

Fig. 6.7 6 months after micropunch skin removal and Hetter ML (0.35% croton oil)

Surgical and Chemical Peel Combined

Micropunch blepharopeeling is a combination surgical and chemical peel procedure recently developed for correcting mild to moderate dermatochalasia (Figs. 6.6, 6.7, and 6.8) [15, 16]. This procedure involves superficially injecting buffered lidocaine with epinephrine into the upper eyelid, then applying very superficial 89% phenol (0.1% Hetter also works well) to the area between the upper eyelid's superior tarsal plate border and the eyebrow's inferior margin, as well as to within 1–2 mm of the

Fig. 6.8 2, 6, and 11 days post-treatment

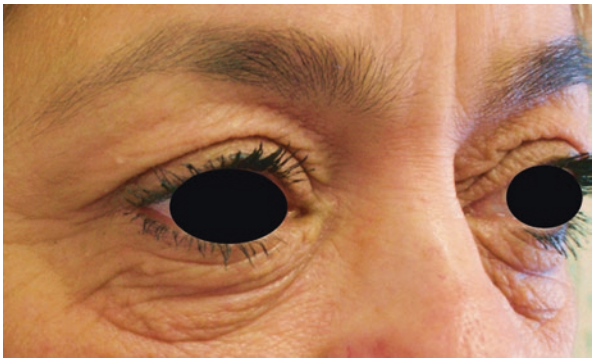

Fig. 6.9 Pre-treatment; combination of surgical and chemical peel treatment proposed

lower eyelid margin [15]. Immediately after frosting, multiple 3–5 mm snips (using iris scissors and Bishop-Harmon forceps) are performed randomly in the centrolateral upper eyelid [4]. Anywhere from 5 to 20 snips may be performed, and these are allowed to heal by secondary intention. Postoperative care includes gentle cleansing and applying Aquaphor™ for 5–6 days [15].

This is a modification of the pinch blepharoplasty, a well-known procedure which involves excising a 2–3 mm strip along the tarsal crease and suturing the myocutaneous flap using 6-0 nylon [11]. Pinch blepharoplasty and phenol-croton oil peels can be combined as well (Figs. 6.9 and 6.10) [6].

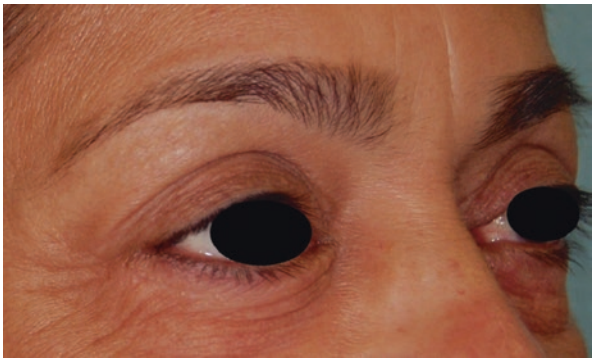

Fig. 6.10 After upper blepharoplasty, lower pinch blepharoplasty and Hetter VL (0.1% croton oil)

Periorbital Hyperpigmentation

Background

POH is easily recognizable, presenting as a bilateral, even-toned, light or dark brown or bluish-black pigmentation around the eyelids (most prominently in the lower lids) [17]. Periorbital dark circles are very troubling cosmetically as they can give the impression of being sad, tired, stressed, or aging. They may also contribute to a diminished sense of self-confidence and well-being [17]. These dark circles can affect patients across every age group, sex and skin type [18]. Possible causative factors of POH include excessive familial melanin pigmentation, hemosiderin deposition from inflammation (irritant contact dermatitis or atopy), and certain medications such as oral contraceptives or ophthalmic prostaglandin [1, 2, 17]. While POH is fairly common, not all dark circles are due to true POH; some dark circles may be caused by translucent lower eyelid skin above the orbicularis oculi muscle. In addition, skin laxity and deep tear troughs may create shadowing which looks similar to POH [1].

Physical Exam

True POH can be distinguished from shadow by stretching the eyelid skin. While the color will clear entirely if it is due to shadow, true POH will only lighten [1, 3]. If the skin coloring becomes more violaceous, this is a sign of thin skin or hypervascularity. Under the light from a Woods lamp, epidermal POH becomes darker whereas dermal tones get lighter [3]. There is often a link between thin skin, a deep shadowy tear trough and a low-set inferior bony orbital rim [1]. However it is unusual to find POH in high-set cheek bones.

Treatment Options for POH

There are many different treatment options for POH, including topical agents like bleaching creams with hydroquinone, kojic or azelaic acid, retinol or retinoic acid, or vitamin C; chemical peels of various strengths; ablative and non-ablative laser therapies; autologous fat transplantation; injectable fillers; and surgery (blepharoplasty) [3, 18]. When performing chemical peels, 2–4 weeks of pretreatment with topical agents is recommended to avoid PIH [3, 14]. Additional physical modalities include camouflage and concealing make-up.

Role of Chemical Peels in Treating POH

Chemical peels can temporarily help correct POH by producing neocollagenesis. This effect camouflages the underlying orbicularis and vasculature which contribute to dark circles. Peeling agents remove melanin from the stratum corneum and epidermis. Deeper peels, which reach the dermis, can remove some of the dermal melanin content [2].

Superficial Peels

The most common peeling agent for POH is 20% glycolic acid (neutralized with sodium bicarbonate) which can result in 73% improvement of melanosis [5, 19]. Lactic acid 15% can result in 56% improvement in periorbital melanosis [19]. 20–30% salicylic acid is also highly effective and low-risk; this can be applied every 2 weeks with little to no downtime (Figs. 6.11 and 6.12). Alternatively, microneedling can be combined with 10% TCA; this has been shown to improve hyperpigmentation in over 90% of patients [20].

Valvouli's study showed that four weekly 3.75% TCA and 15% lactic acid peels (in gel base) resulted in 90% of patients having excellent improvement at 6 months of follow-up [18]. His group reported minimal side effects with 20% of patients experiencing itching, 46.6% experiencing a mild burning sensation, 33.3% experiencing erythema or exfoliation, and 20% experiencing dryness.

Fig. 6.11 PIH before treatment

Fig. 6.12 PIH after 6 sessions of 30% salicylic acid peels. Only sunscreen was applied between peels (photos courtesy of Dr. Rashmi Sarkar)

Fig. 6.13 POH before treatment

Fig. 6.14 After peeling upper lid with Exoderm™ (photos courtesy of Dr. Marina Landau)

Medium Depth Peels

The most common medium peeling agent is TCA. These peels are available in a variety of concentrations and can be used to achieve deeper treatments with increasing concentration. Some physicians prefer using the phenol-croton oil peels for dermal melanosis seen in POH (Figs. 6.13 and 6.14), as superficial peels may not penetrate deep enough to remove this melanosis (Dr. Marina Landau, personal communication, May 2019). Medium depth phenol-croton oil peels are effective for

resistant POH. Both TCA and phenol-croton oil peels require a 2–4 week preparation with retinoids and bleaching agents, as well as postoperative attention to PIH [5]. Regardless of the croton oil or phenol percentage used, the peeling solution should always be applied with a damp (not wet) Q-tip; application should be stopped as soon as a light white frost with a background erythema is achieved, indicating a medium depth peel down to papillary dermis. Postoperative care includes white vinegar compresses (1 tbsp. in 1 cup of water) and Vaseline/Aquaphor™ ointment for 5–6 days.

Adverse Events

1. Post-inflammatory hyperpigmentation (PIH) is the most common adverse event from peels (Figs. 6.15, 6.16, and 6.17). This is temporary and may be seen weeks after the initial recovery period [13]. PIH responds well to topical retinols/retinoids, mild anti-inflammatory agents and hydroquinone 2–4%. Sun protection is necessary to prevent hyperpigmentation [4].
2. Eyelid ectropion can result from overaggressive peeling of the lower lids. Caution should be taken when performing peels for lid laxity. The preoperative exam should assess this risk and select a milder peel if significant risk factors are present [6, 12].

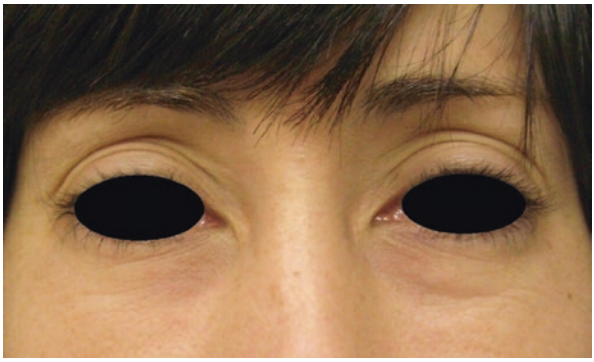

Fig. 6.15 Mild laxity before treatment

Fig. 6.16 PIH 2 months after lower lid segmental peel

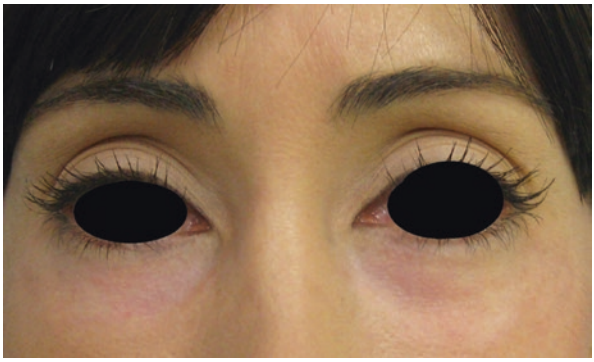

Fig. 6.17 PIH resolved

3. Prolonged erythema (greater than 12 weeks) is a real possibility and requires expert and prompt attention. Overaggressive peeling is usually a factor as well as not preparing the skin with retinoids before-hand [6, 12].
4. Clogged pores or milia may occur early in the healing process, and are linked to overzealous postoperative use of occlusive ointments. Using hyaluronic acid serums or light lotions helps prevent these. Milia can be treated with retinols, or incised and drained with a fine needle or 11-blade [13].

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