
Periorbital Rejuvenation: A Review of Dermatologic Treatments

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BACKGROUND. The periorbital region serves as a barometer of chronologic and environmental age and, as such, patients often seek its cosmetic rejuvenation.

OBJECTIVE. The purpose of this article was to review the dermatologic treatments available for periorbital skin rejuvenation.

METHODS. Topical retinoic and glycolic acid preparations, chemical peels, botulinum and collagen injections, dermabrasion, and laser resurfacing procedures for periorbital skin rejuvenation were reviewed. The relative benefits and risks of each treatment were detailed.

RESULTS. Minimal photodamage with mild rhytides should be responsive to topical acid therapy and superficial peels, whereas moderate wrinkling and photodamage generally require medium-depth peels, collagen injections, or erbium:YAG laser resurfacing. Deeper rhytides and more extensive cutaneous photodamage usually necessitate CO₂ laser resurfacing and botulinum injections.

CONCLUSIONS. Proper patient selection and assessment of aging severity are critical to determine the best therapeutic option.

THE ONGOING quest for a youthful image has not diminished in this era of aging "baby boomers." This is exemplified by the different therapies that are currently available for use or are undergoing clinical investigation. The face and, in particular, the eyes are often used as an immediate gauge of chronologic age. Consequently, most rejuvenative treatments are directed to the improvement, if not elimination, of rhytides in the periorbital area. This article reviews dermatologic treatments currently in use for periorbital skin rejuvenation.

Background

Clinically, photoaged skin appears wrinkled, blotchy, and leathery. Histologically, dyskeratotic keratinocytes are present with evidence of epidermal atrophy and flattening of the dermo-epidermal junction.¹

The periorbital region is a difficult area to treat because of its delicate nature and important function. Eyelid skin is the thinnest in the body with the epidermis measuring a mere 0.04 mm thick.² Careful alteration of the anatomic eyelid structure is crucial in order to avoid any compromise of function. Because of the protective role of the eyelids, ocular complications may occur if the lids are unable to close completely.

Periorbital wrinkles ("crow's feet") are primarily the result of cumulative ultraviolet light-induced "photoaging" and muscle movement. The orbicularis oculi muscle fibers are arranged in a concentric fashion around

each eye. Upon muscle contraction, folding or wrinkling of the overlying skin occurs, accentuating the cumulative sun damage in this area. Thus, the ideal treatment for periorbital aging should address both intrinsic (muscle movement) and extrinsic (ultraviolet light exposure) processes. For optimal results, two or more therapeutic modalities may be necessary.

Topical Therapy

Tretinoin (Retinoic Acid)

Topical retinoic acid or tretinoin (Retin-A, Ortho-Pharmaceutical, Raritan, NJ) is one of the few topical treatments available in which the beneficial effect on photoaging has been documented by several authors, beginning with Kligman's observation of improved skin texture and wrinkling in a post-adolescent acne patient placed on long-term tretinoin therapy.³⁻⁵ The features showing the most consistent and significant improvement within 4-10 months of therapy are skin texture, mottled hyperpigmentation, and fine wrinkles.^{6,7} The use of 0.05% and 0.1% tretinoin cream for six months leads to an increase in epidermal and granular layer thickness.⁸ The improvement seen in skin texture is attributed to hyaluronic acid deposition and compaction of the stratum corneum.⁶

A limiting factor of tretinoin therapy is its tendency to cause skin dryness. In order to counteract this effect, new emollient formulations have been produced (Renova, Ortho). Long-term studies of tretinoin emollient cream using skin textural analysis have shown continued clinical improvement of fine wrinkling, dyspigmentation, and roughness after 48 weeks of use.

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Histologically, reversal of stratum corneum compaction and epidermal and granular layer thickness is observed after 24 weeks of therapy. Melanin content decreases and epidermal mucin increases after 48 weeks.⁹

Another retinoid, retinol (all-trans-retinol or vitamin A₁) has been discovered to possess similar activity as retinoic acid without the irritative effects. Retinol application of up to a 1.6% concentration produces much less erythema when compared to retinoic acid 0.025% while inducing epidermal thickening and increasing expression of cellular retinoic acid-binding protein (CRABP-II mRNA) and cellular retinol binding protein (CRBP mRNA) similar to that of retinoic acid.¹⁰

Alpha Hydroxy Acids (AHAs)

Over the past few years, AHAs have become popularized and incorporated in the skin care maintenance regimens of thousands of individuals. AHAs are linear organic carboxylic acids with an attached hydroxyl group and can be derived in natural foods; hence the common name, fruit acids. Included in this class of acids are glycolic acid found in sugar cane, lactic acid from sour milk, malic acid from apples, citric acid from citrus fruits, and tartaric acid derived from grapes. Glycolic acid, the simplest of the alpha hydroxy acids, is the most popular fruit acid and is available in concentrations ranging from 5% to 15%. Higher concentrations of this acid are used for chemical peels.

In photoaging, the skin surface is rough and dry due to the accumulation of corneocytes. AHAs exert their epidermal effect at the stratum corneum-stratum granulosum junction. A thinner stratum corneum with a normal-appearing basket-weave pattern is achieved by diminishing corneocyte cohesion, thus promoting a smoother, more supple skin surface.¹¹⁻¹⁴

The use of AHAs has been shown to reverse histologic signs of photoaging by increasing epidermal thickness, reversing basal cell atypia, dispersing melanin pigmentation, and normalizing the rete pattern of the dermoepidermal junction. The increased skin thickness is attributed to increased synthesis of glycosaminoglycans, collagen, and possibly elastic fibers.¹⁵

AHAs have also been used as an adjunct to tretinoin therapy without increasing adverse sequelae.^{11,13,16} Large-scale controlled studies are still needed in order to verify the effects and advantages of this combination treatment.

Chemical Peels

Chemical peeling is one of the most common procedures performed in dermatologic offices for skin rejuvenation. The process involves the application of a caustic chemical agent on the skin to produce a controlled, par-

tial-thickness injury. Chemical peels are categorized into superficial, medium-depth, and deep types.

Superficial peels penetrate the epidermis down to the dermal-epidermal junction. An example of a superficial peeling agent is Jessner's solution, which is a combination of resorcinol, salicylic acid, and lactic acid in an alcohol solution. Triple-layer application of the combination produces stratum corneum separation with upper intraepithelial and intercellular edema. The dermis is not affected with this solution.^{17,18}

Glycolic acid at concentrations of 20% to 70% is a more popular agent used for superficial chemical peeling. The effect of a glycolic acid peel depends on the length of time it is left on the skin and, thus, needs to be neutralized either with water or sodium bicarbonate to prevent deeper dermal penetration. Glycolic peels are routinely performed in a series of 4 to 6 treatments at 1 to 6 week time intervals in order to improve skin sallowness, dyspigmentation, and fine wrinkles.¹⁹⁻²¹ For mild photodamage and wrinkling, an initial application of 70% unbuffered glycolic solution is recommended for a duration of 4 to 8 minutes.¹⁹ Because of varying individual responses, continuous monitoring of the patient is imperative to assess epidermolysis and undue skin color change. Histologic comparison studies of 35% trichloroacetic acid (TCA) and 70% glycolic acid revealed similar findings of thickened collagen fibers and elastic fibers in the papillary dermis at 2 months; however, only TCA demonstrated epidermal necrosis. The histologic changes reversed to pretreatment conditions after 19 months.²⁰

Trichloroacetic acid is a versatile peeling agent because the concentration may be adjusted in order to achieve the desired depth of peel. Concentrations of 15% to 35% TCA can be used for superficial peeling. TCA causes necrosis and exfoliation of normal and actinically damaged cells and also precipitates epidermal proteins. This acid is nontoxic systemically and is neutralized by serum in superficial dermal blood vessels.²¹ Partial epidermal exfoliation occurs with 20% TCA, therefore a series of peels may be necessary in order to optimize the rejuvenating effects of papillary dermal remodeling.²² Application of TCA causes transient frosting and erythema. In the subsequent 24-48 hours, the skin darkens, followed by exfoliation by the third or fourth day. Acid application may be repeated after 1 to 2 weeks.²³

To ensure an even application of acid, some manufacturers add sodium fluorescein to the solutions, rendering the preparation visible under a Wood's lamp. This technique helps detect skip areas and avoids overcoating. Another TCA peel modification is the Obagi "blue peel" which contains a non-ionic blue base with glycerin and saponins in order to slow the rate of TCA action and to gauge the depth of peel.²⁴ A light blue end point signifies

exfoliation to the stratum corneum, while a dark blue endpoint denotes coagulation to the basal layer of the epidermis. These superficial peels are desirable because of the minimal recovery time needed and the reduced likelihood of serious adverse sequelae. Furthermore, all skin types may be treated with superficial peels.²⁵

Medium-depth peels pertain to the use of agents or a combination of agents in order to produce an injury depth down to the upper reticular dermis.²⁶ These peels are best used to treat actinic keratoses, dyschromia, and mild wrinkling. Concentrations of TCA ranging from 40% to 60% cause epidermal necrosis, edema, and homogenization of the papillary dermis and sparse lymphocytic infiltration in the midreticular dermis within 3 days after application.¹⁷ The use of 60 to 75% TCA is recommended only for spot treatment of localized keratoses. 50% TCA may be applied either in a rapid fashion over the entire face without overcoating or in a slow, controlled manner to each cosmetic unit. The eyelids are peeled with 20% to 35% TCA. (Figure 1). Higher concentrations of TCA cause more pain than the combination peels discussed below, hence, sedation may be necessary.²⁶ Contrary to expectations, tape occlusion of TCA decreases its depth of penetration.²⁷ Transepidermal water loss is hindered upon occlusion, causing a dilution of the acid's concentration.²²

Present trends dictate combining less potent agents in order to achieve a medium-depth peel. In an attempt to decrease the risk of complications, a superficial peeling agent is initially used in order to pretreat the epidermis followed by TCA application. After degreasing the skin with acetone, either dry ice or Jessner's solution can be applied to initiate an epidermal injury. This then enables the 35% TCA to penetrate more readily.^{18,26,28} A newer combination is the use of 70% unbuffered aqueous glycolic solution to soap-clean skin without prior degreasing with acetone.²⁶ Left on for 2 minutes, this solution causes epidermolysis allowing deeper penetration of subsequent 35% TCA solution application. Histologic examination of skin treated with each of these three combination peels is similar with new collagen formation evident in the Grenz zone. The deepest medium-depth peel, dry ice, and TCA is not recommended for darker skin tones due to the risk of hypopigmentation. Approximately an hour following a medium-depth peel, cutaneous erythema changes to a brownish hue. Edema with minimal discomfort is typical for the first 48 hours. After partial resolution of the edema, crust formation ensues, with epidermal separation occurring 4 to 8 days after the procedure.^{21,28}

Deep peels involve the use of chemoexfoliants that penetrate to the midreticular dermis. Indications for their use include deep rhytides secondary to photo-damage and treatment of severe or extensive actinic



Figure 1. Mild to moderately severe periorbital rhytides in a 52-year-old woman before (A) and 1 month after two 25% TCA chemical peels at biweekly intervals (B).

keratoses. Deep chemical peeling entails longer healing times and increased potential for complications.

Baker's formula is the most commonly used deep chemical peel. It is composed of a mixture containing 3 ml 88% phenol USP, 3 drops croton oil, 8 drops Septisol, and 2 ml distilled water. Phenol at 80% or higher concentrations precipitates epidermal proteins, thus forming a barrier hindering deep dermal penetration, while phenol diluted to 50% is keratolytic, allowing increased dermal penetration and hence greater dermal injury. The croton oil is an epidermolytic agent that augments phenol penetration. Septisol increases surface tension and is thought to slow the penetration of phenol.^{23,29} The phenol peel may be applied under occlusion using waterproof zinc oxide nonporous tape or left unoccluded. Occlusion increases the penetration of phenol by promoting tissue maceration and prevention of the agent's evaporation.^{30,31}

The reaction following application of phenol is characterized by keratocoagulative necrosis of the epidermis extending into the papillary dermis and by a marked inflammatory reaction. Epidermal regeneration begins within 48 hours and is completed within 1 week. Dermal regeneration takes longer than epidermal healing and is characterized by rigid, compact collagen in the upper dermis replacing the disorganized collagen seen in elastosis.³²

Deep phenol peeling may lead to irreversible hypopigmentation and, thus, is not advised for darker skin types. Cardiac arrhythmias may occur with systemic absorption of phenol, necessitating cardiac monitoring and slow application of the solution.²⁸

Adverse sequelae following superficial and medium-depth peels are usually minor and reversible, including prolonged erythema and post-inflammatory hyperpigmentation. Hypertrophic scarring can occur on rare occasions and can be managed by the use of any one or a combination of therapies, including topical or intralesional steroids, silicone gel sheeting, and pulsed dye laser irradiation.²⁸ Infections such as herpes simplex reactivation can occur and could lead to scarring.³³

It is common practice to pretreat patients with tretinoin and/or hydroquinone for 4 to 6 weeks prior to a chemical peel. This regimen decreases the stratum corneum thickness ensuring a more uniform response following the application of the peeling solution.^{22,23}

Botulinum Toxin A Injections

Botulinum type A exotoxin (Botox, Allergan, CA) is not a new therapeutic agent, having been used for strabismus and blepharospasm since 1980.^{34,35} Its potential use in the cosmetic field was first observed by Carruthers in 1986 when a patient treated for blepharospasm demonstrated marked improvement of frown lines. A series of studies were performed to evaluate the safety and effectiveness of this modality on rhytides.^{36,37} The botulinum toxin binds to terminal receptors at the pre-synaptic neuron of the motor unit which is then internalized into the nerve cytosol by endocytosis, thereby inhibiting acetylcholine release.³⁸

Dermatologic use of Botox has traditionally been limited to glabellar furrows, but its use has expanded to the treatment of forehead and periorbital rhytides, among others. Since periorbital rhytides result from both photoaging and contraction of the orbicularis oculi muscles, the treatment goal is muscle weakening, not paralysis.^{36,37} Use of this treatment either prior to or after periorbital laser resurfacing augments the effects of the laser and helps maintain the improved appearance of wrinkles.³⁹ (Figure 2)

The toxin is injected periorbitally within 4 hours of its dilution, usually 1 to 1.5 cm lateral to the lateral

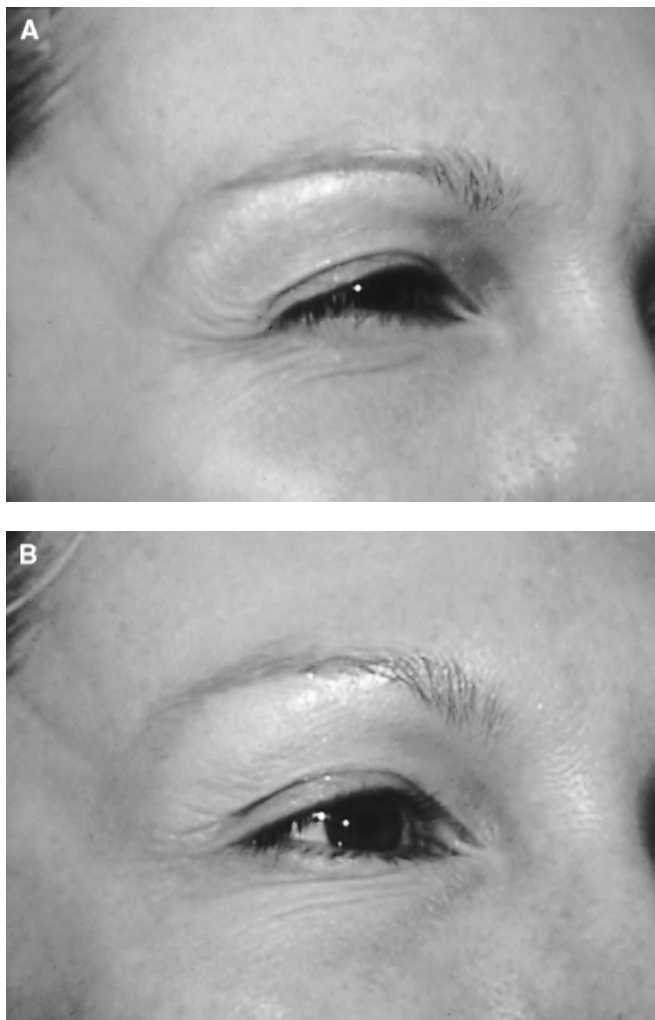


Figure 2. A 41-year-old woman with mild to moderate periorbital rhytides before (A) and 3 months after lateral canthal injections of 18 units of botulinum toxin (9 units per eye). (B). Both photographs were taken when patient was squinting.

orbital rim with 3 unit injections. Electromyographic guidance may be used during injection in order to localize functioning musculature. Ice compresses are advised after treatment in order to reduce ecchymoses. Patients are advised to keep upright for at least 4 hours and to contract the treated muscles in order for the toxin to be taken up by the involved neural end-plates.⁴⁰

Reported adverse effects of Botox injections in the lateral orbital area include worsening of preexisting fat herniations of the lower eyelid, temporary droop of the lateral lower eyelid, and skin redundancy beneath the lateral lower eyelid. These complications may be avoided by injecting more laterally and, in cases of skin redundancy, combining Botox injections with cutaneous resurfacing.³⁶

Collagen Injections

The aim of any collagen implantation process is to substitute or enhance diminished or altered native collagen in order to elevate skin contour depression. There are three available formulations of injectable exogenous bovine collagen: Zyderm I, Zyderm II, and Zyplast (Collagen Corporation, CA). These formulations are composed of reconstituted bovine collagen suspended in saline, with the more antigenic telopeptides removed by enzymatic digestion. Zyderm I contains 35 mg/cc of collagen while Zyderm II contains 65 mg/cc of collagen, both have 0.3% lidocaine added to reduce pain associated with injection. Zyplast consists of highly purified bovine collagen with 0.3% lidocaine and 0.0075% glutaraldehyde. Crosslinks in the collagen molecule are produced with the addition of glutaraldehyde to make the collagen more resistant to degradation by proteolytic enzymes and less immunogenic.⁴¹

Zyderm I is the most versatile of the three bovine collagens and is used to correct superficial dermal defects. Injection is targeted to the upper dermis. Side by side injections are placed in the upper dermis in order to produce an overcorrection of 150% to 200%. Zyplast is used for deeper dermal defects and is best placed in the mid-dermis. A layering technique whereby Zyderm I is immediately implanted over the mid-dermal Zyplast injection sites is used to optimize clinical correction.⁴²

Erythema, temporary overcorrection, wheal formation, edema, and bruising are common after collagen injection. Occasionally, skin lumpiness, hypersensitivity reactions (despite negative skin testing), and reactivation of herpes simplex infection may occur. Rare adverse sequelae include recurrent intermittent swelling at the treatment site, local necrosis, abscess formation, and loss of vision due to collagen embolus to the ophthalmic artery.⁴² Collagen implantation offers excellent results. However, repeat injections at 4 to 12 month intervals are necessary in order to maintain the clinical effect.

Despite the ease of application and good overall cosmetic effect of collagen implantation, the periorbital area is the least responsive to collagen injections. This may be related to the thin dermis of periorbital tissue that contains loose stroma and a relatively high liquid/mucin component. These characteristics make placement of dermal filler difficult with their eventual rapid dissolution.⁴³

The risk of hypersensitivity reactions to bovine collagen injection and its relatively short-term efficacy stimulated research in the use of human collagen for skin augmentation. Autologous collagen fibers can be prepared from mechanical pulverization of the recipient patient's own excised skin (Autologen, Collagenesis, Beverly, MA) or, alternatively, the patient's fibro-

blasts can be cultured *in vitro* from a small biopsy for 4 to 6 weeks (Isolagen, Isolagen Technologies, Paramus, NJ).^{44,45} Ongoing multi-center clinical trials are being conducted to evaluate the clinical efficacy and adverse effects of cadaveric human collagen (Dermalogen, Collagenesis) compared to bovine collagen. The use of human collagen diminishes the possibility of hypersensitivity reactions and may lead to more prolonged clinical effects.⁴⁴⁻⁴⁶

Dermabrasion

Dermabrasion is a process of surgical skin planing whereby a wire brush or diamond fraise attached to a rotary instrument is used to abrade the skin, effectively removing the epidermis and the upper and middle dermis, including the upper portions of adnexae. Reepithelialization and repigmentation occurs from the adjacent hair follicles and residual adnexal structures.

Dermabrasion has been used primarily in the treatment of atrophic acne scarring, however, superficial dermabrasions extending only to the level of papillary dermis have been performed on patients with actinically damaged skin.⁴⁷⁻⁴⁹

Histologic studies of pre- and post-dermabraded skin demonstrate reversal of actinic features. Specifically, the epidermis shows eventual return of the rete pattern in 2 years and disappearance of dyskeratotic keratinocytes. In the dermis, expansion of the Grenz zone with thickened and increased numbers of collagen bundles are observed. The resulting skin smoothness and improved texture and turgor after dermabrasion have been attributed to these histologic changes.⁵⁰

The equipment used for dermabrasion is not expensive and large areas may be treated in short periods of time; however, fine control is difficult due to the instrument's bulkiness. Because it is best to have an immobile and relatively rigid skin surface on which to work, eyelids and periorbital regions are almost impossible to treat with dermabrasion. Moreover, the procedure is bloody, rendering intraoperative visualization of the skin difficult. Other concerns include infectious potential of aerosolized particles such as HIV and hepatitis B and risk of complications such as permanent dyspigmentation and scarring.^{50,51}

Laser Resurfacing

Carbon Dioxide (CO₂) Laser

Dermatologic surgery has been revolutionized with the development and clinical expansion of laser technology. Cutaneous laser resurfacing involves the vaporization of the entire epidermis as well as a variable thickness of the dermis. Water-containing cells of the epidermis and

dermis can be preferentially targeted by laser light using the principles of selective photothermolysis.⁵²

The CO₂ laser emits monochromatic 10,600 nm light which is preferentially absorbed by water-containing tissues. In order to minimize the thermal damage to surrounding skin, it is also important to deliver sufficient energy to the target chromophore at a pulse duration shorter than the time it takes for the lased tissue to lose 50% of its heat (thermal relaxation time). With the newer pulsed and scanned CO₂ laser systems, high energies can be delivered above the skin ablation threshold of 5 J/cm² at a tissue dwell time of less than 1 ms, which is the thermal relaxation time of the epidermis.⁵³⁻⁵⁵ Histological comparisons of different CO₂ laser systems have demonstrated variable depths of tissue ablation and residual thermal damage; however, clinical efficacy is comparable when proper technique is used.⁵⁶⁻⁵⁸ In general, with each laser pass, increased residual thermal necrosis is observed due to extensive heat absorption of partially desiccated tissue and decreased vaporization upon delivery of each subsequent laser pass.⁵⁶⁻⁵⁸

Of all facial regions, rhytides in the periorbital area respond best to CO₂ laser resurfacing with up to 90% clinical improvement observed from baseline.⁵⁹ In addition, infraorbital hyperpigmentation improves after CO₂ laser resurfacing.⁶⁰ Typically, only a couple of non-overlapping laser passes using any of the CO₂ laser systems are necessary to achieve significant clinical improvement.

A study comparing the CO₂ laser resurfacing with a medium-depth peel (Jessner's followed by 35% TCA) in the treatment of periorbital rhytides demonstrated better wrinkle scores after laser resurfacing.⁶¹ However, postoperative erythema was more prolonged after laser treatment than after chemical peeling. In a comparison study of two high-energy pulsed CO₂ lasers in the treatment of periorbital wrinkles, the "ultrapulse" CO₂ laser provided a slightly better clinical response (82% mean improvement) and required fewer laser passes than did the "surgipulse" CO₂ system (63% mean improvement).⁶² Healing times were equivocal for the two systems.

In addition to the layer-by-layer vaporization of skin that occurs with CO₂ laser resurfacing, collagen shrinkage also results from thermal denaturation of type I collagen. The laser-induced dermal injury is thought to promote collagen deposition, with a wider zone of fibroplasia.⁶³ The combination of vaporization, collagen shrinkage, and collagen deposition accounts for the clinical improvement seen.⁶⁴ (Figure 3)

Adverse effects observed after CO₂ laser resurfacing include prolonged erythema, hyperpigmentation, milia, infections, hypersensitivity, scarring, and ectropion.⁶⁵⁻⁷¹ Post-treatment erythema, which is an expected side effect, is seen in all patients and can persist for several months.⁶⁶ Hyperpigmentation has been reported to



Figure 3. Facial photodamage with prominent periorbital rhytides and dermatochalasis in a 53-year-old woman before (A) and 5 months after (B) periorbital CO₂ laser resurfacing using a 5-mm scanning handpiece at 300-mJ energy, 60-watt power, density of 6. Two passes were delivered with complete removal of partially-desiccated tissue after each pass.

occur in 2.8% to 36% of cases, with the highest incidence in patients with darker skin tones. Some authors recommend the use of hydroquinone and retinoic acid two to six weeks prior to laser resurfacing and postoperatively in order to decrease the risk of hyperpigmentation.^{65,67} Alternatively, post-laser hyperpigmentation may also be managed with a series of superficial glycolic acid peels in order to hasten the resolution of dyspigmentation.^{54,66} Reactivation of latent herpes simplex virus can occur and is typically observed in the first postoperative week.^{66,68} Bacterial and candidal infections have also been documented.^{54,65,66,69,70} A severe complication associated with periorbital laser resurfacing is the development of lower lid ectropion. This occurs more often in patients with prior eyelid surgery or concurrent resurfacing with blepharoplasty and of-

ten necessitates surgical correction.^{54,66,71} It is imperative that proper assessment of eyelid elasticity be made preoperatively in order to determine the appropriate adjustments in laser protocol.

In a continuous mode, the CO₂ laser may be used to assist blepharoplasty in conjunction with laser resurfacing.⁷² (Figure 4) The main advantage of incisional laser surgery over conventional cold steel and electrocautery is its improved intraoperative hemostasis, with subsequent decreased ecchymoses and edema.⁷³ The continuous wave CO₂ laser is capable of photocoagulating blood vessels up to 0.5 mm in diameter and sealing small lymphatic vessels and nerve endings, thereby also leading to decreased postoperative pain.⁷⁴ Combining laser blepharoplasty and cutaneous resurfacing has additional advantages, including improved clinical efficacy and a single, rather than double, healing process.

Erbium:Yttrium-Aluminum-Garnet (Er:YAG) Laser

The erbium:YAG laser is one of the latest additions to the armamentarium of resurfacing treatments for rhytides. The laser light is emitted in the mid-infrared electromagnetic spectrum at 2,940 nm which is highly absorbed by water. Thus, water-containing cutaneous tissues can be vaporized, much like the CO₂ laser system.^{74,75} In contrast, however, insignificant residual thermal damage is produced in the dermis due to the brief pulse width with minimal heat conduction.^{76,77} Significant clinical improvement of periorbital and other facial rhytides has been reported with remarkably speedy recovery times.⁷⁷⁻⁸⁰ Minimal, if any, collagen contraction occurs; however, erbium:YAG laser resurfacing is less desirable than CO₂ laser resurfacing or blepharoplasty for dermatochalasis or moderate to severe periorbital rhytides.^{79,80} In addition, the reduced hemostatic effect of the erbium:YAG laser compared with that of the CO₂ laser may impair intraoperative visibility due to bleeding.

The major advantage of cutaneous laser resurfacing is the control of skin vaporization layer-by-layer in a relatively clear field. When proper laser technique and postoperative management is used, the risk of scarring or other complications is minimized and clinical results are equal to, if not better than, that obtained with chemical peels or dermabrasion. The major disadvantages of using this advanced laser technology are the technical skill learning curve required of surgeons and the monetary expense and postoperative time commitment required of patients.

Conclusion

It is evident that there are several dermatologic therapies from which to choose for periorbital skin rejuvenation.

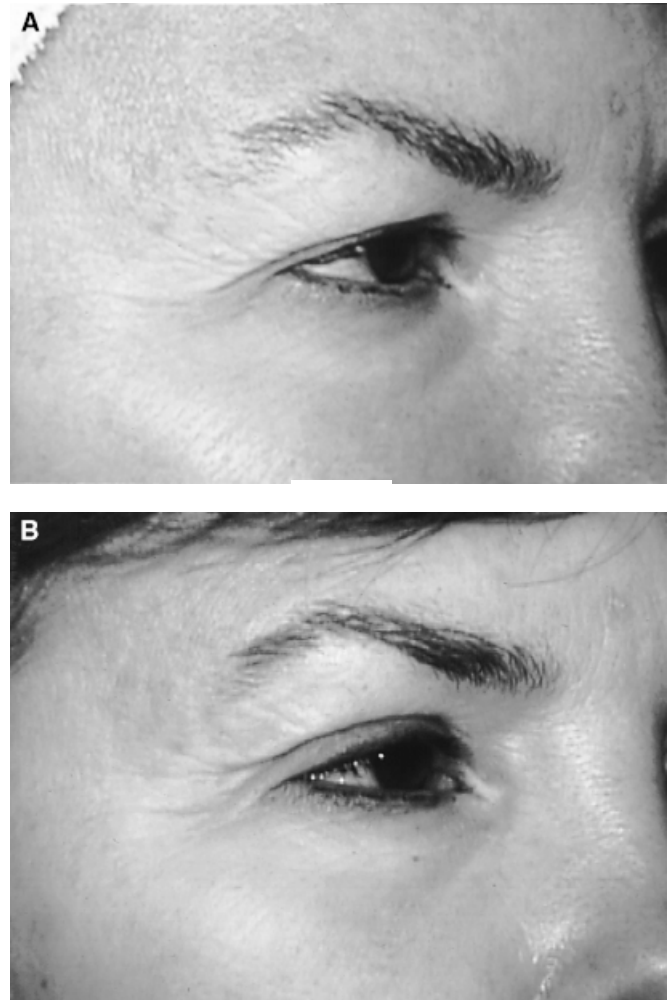


Figure 4. Dermatochalasis and herniated orbital fat of lower eyelids in a 53-year-old woman before (A) and 1 month after laser-assisted upper and lower blepharoplasties (B).

Proper patient selection and assessment of aging severity is important in order to determine the best therapeutic option. Minimal photodamage with mild rhytides should be responsive to topical acid therapy and superficial peels, whereas moderate wrinkling and photodamage may necessitate medium-depth peels, collagen injections, or erbium laser resurfacing. Deeper rhytides and more extensive cutaneous photodamage are better managed with CO₂ laser resurfacing and Botox injections. Of equal importance are the patient's expectations from the therapy, necessitating a proper preoperative consultation to discuss the anticipated results and possible side effects from each of the aforementioned procedures. Lastly, maintenance of the newly rejuvenated skin through sun protection and a good skin care regimen is important to prolong the clinical results.

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