Dark Circles
Etiology and Management Options

Daniel P. Friedmann, MD[a,*], Mitchel P. Goldman, MD[b,c]

KEYWORDS

• Under-eye circles • Infraorbital hyperpigmentation • Tear trough • Nasojugal groove
• Suborbicularis oculi fibroadipose tissue • Intense pulsed light • Fractionated resurfacing
• Soft-tissue augmentation

KEY POINTS

- Under-eye dark circles are an unsurprising source of aesthetic concern of patients owing to the fatigued and less youthful appearance that they can impart.
- The etiology of under-eye circles is multifactorial and includes periorbital volume loss and skin laxity, orbital fat prolapse, increased prominence and density of subcutaneous vasculature, and excessive pigmentation.
- The ease of use, minimal incidence of complications, and lack of downtime associated with hyaluronic acid fillers make these products nearly ideal for treating infraorbital volume loss.
- Long-pulsed lasers target lower eyelid vasculature; Q-switched lasers and fractionated resurfacing treat cutaneous pigmentation. Skin laxity can be improved with fractionated resurfacing and microfocused ultrasound.
- Standardized pretreatment and posttreatment digital photography is essential. Variations in lighting alone may mask or worsen lower eyelid appearance.

INTRODUCTION

Periorbital cutaneous and structural changes play a significant role in the perceived age of individuals of all ages and races.[1–3] The relative darkening of lower eyelid skin, commonly referred to as under-eye (infraorbital) dark circles or periorbital hyperpigmentation, can impart a fatigued and less youthful appearance to the face. Dark circles are therefore an unsurprising source of significant aesthetic concern for a number of patients.[4,5]

ANATOMY

Any evaluation of lower eyelid dark circles must begin with an appropriate understanding of the underlying periorbital anatomy (**Fig. 1**). The lower eyelid begins at the free palpebral margin and extends caudal to the inferior orbital rim, merging into the superior aspect of the cheek. It is bordered laterally by the lateral canthus and malar eminence and medially by the medial canthus and lateral nasal sidewall. The tear trough is an anatomic depression found in all age groups that extends obliquely from the medial canthus along the medial third of the lower eyelid.[6] It is bound medially by the anterior lacrimal crest and inferiorly by the inferior orbital rim, lying within the limits of the orbicularis oculi muscle and corresponding to the anatomic location of the lacrimal sac.[6,7] The tear trough forms the superior anatomic aspect of the nasojugal groove, which extends below the orbital rim.[7–9]

Funding Sources: None.
Conflict of Interest: Consultant for SkinMedica, Inc and speaker for Lumenis Ltd (D.P. Friedmann); Consultant for SkinMedica, Inc, Consultant and speaker for Lumenis Ltd (M.P. Goldman).
[a] Westlake Dermatology Clinical Research Center, Westlake Dermatology & Cosmetic Surgery, 8825 Bee Cave Road, Suite 100, Austin, TX 78746 USA; [b] Cosmetic Laser Dermatology, 9339 Genesee Avenue, Suite 300, San Diego, CA 92121, USA; [c] Division of Dermatology, University of California, San Diego, 9500 Gilman Drive, San Diego, CA 92093, USA
* Corresponding author.
E-mail address: daniel@westlakedermatology.com

Clin Plastic Surg 42 (2015) 33–50
http://dx.doi.org/10.1016/j.cps.2014.08.007

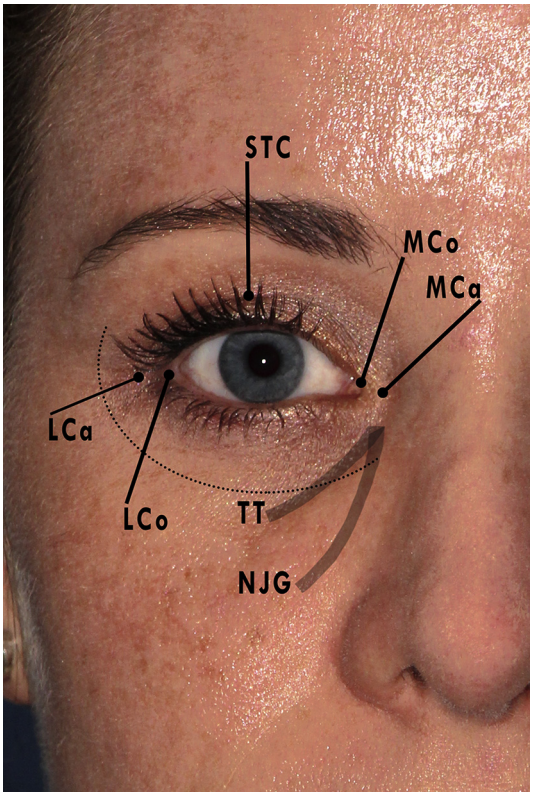

Fig. 1. Periorbital landmarks. *Dotted line* overlies the orbital rim. LCa, lateral canthus; LCo, lateral commissure; MCa, medial canthus; MCo, medial commissure; NJG, nasojugal groove; STC, superior tarsal crease; TT, tear trough.

ETIOLOGY

The formation of dark circles is often multifactorial, with a number of factors reported to play a role (**Table 1**). A retrospective evaluation of periorbital hyperpigmentation in Southeast Asian patients revealed a predominantly vascular etiology, followed by constitutional (ie, periorbital melanosis), postinflammatory hyperpigmentation (PIH), and shadowing types.[11]

Shadowing Effect

Infraorbital skin laxity and volume loss with subcutaneous fat atrophy result from a combination of advancing age and chronic photodamage. These factors, along with hypertrophy of orbicularis oculi muscles, pseudoherniation of suborbicularis oculi fibroadipose tissue, and/or volume loss of the malar cheek, create a shadowing effect on the tear trough.[8] This shadowing is lighting dependent, often masked with the use of direct flash photography.

Excessive Pigmentation

Excessive pigmentation of the lower eyelids owing to a number of underlying causes can also lead to under-eye circle formation.[12–16] Melasma is an acquired facial hypermelanosis common in Southeast Asian and Hispanic populations with Fitzpatrick skin types III-IV that may predominate in the infraorbital areas. UV light exposure, pregnancy, exogenous hormones (including oral contraceptives), and genetic predisposition all likely play a role.[17] Nevi of Ota in Asian populations are either congenital or develop during childhood and are thereby easily differentiated.[18]

Orbital Lipodystrophy from Prostaglandin F2a

Periorbital changes have also been reported with ophthalmic and topical use of the prostaglandin F2a analogs, including bimatoprost 0.03% (Lumigan or Latisse; Allergan, Inc, Irvine, CA), travoprost, or latanoprost.[19] An acquired orbital lipodysotrophy characterized by hollowing of lid sulci may rarely develop from local adipocyte atrophy owing to the potent anti-adipogenic effects of prostaglandin F2a. Improvement is typically noted after cessation of therapy or change to an alternative prostaglandin analog.[20] Ophthalmic use of prostaglandin F2a analogs can also lead to reversible periocular hyperpigmentation owing to increased melanogenesis.[21–23] The risk of pigmentation seems to be dramatically lower with topical bimatoprost for eyelash hypotrichosis because of minimal cutaneous contact via brush application.[24,25]

Subcutaneous Fat and Veins

The minimal infraorbital subcutaneous fat, superficial location of the orbicularis oculi muscle, and thin, translucent skin of the lower eyelid can impart a violaceous appearance to the entire area as a result of prominent underlying intramuscular vasculature. Excess subcutaneous telangiectatic and reticular veins may also play a role.[5,26] Greater dermal vessel congestion and stasis-related extravasation during episodes of physical and mental stress, including menstrual periods and pregnancy, may also worsen dark under-eye circles.

EVALUATION

A thorough history and clinical assessment of the lower eyelids and cheeks is necessary to determine the underlying cause of a patient's dark circles, choose the most appropriate course of treatment, and avoid complications. A history of ocular procedures, trauma, or allergies and the presence of autoimmune and neuromuscular disorders should