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Modified (Scarless) Orbital Decompression Technique

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KEYWORDS
• Orbital decompression • Thyroid eye disease • Graves disease • Sclera show • Exophthalmos • Bulging eye

KEY POINTS
- Eye prominence (bulging eyes) can be a bothersome feature for some patients, both esthetically and functionally.
- Orbital decompression has long been used to reduce bulging eyes.
- Over decades, there have been several advances in orbital decompression technique with less and less invasive techniques designed.
- A modified (scarless) orbital decompression can reduce bulging eyes in esthetic (and nonesthetic) patients with quicker recovery.
- Experience and expertise are critical to achieve safe and effective results for orbital decompression surgery.

ESTHETIC ORBITAL DECOMPRESSION

There are many people who are bothered by the appearance/prominence of their eyes and desire esthetic improvement; they complain, "my eyes don't fit my face." Although thyroid eye disease is a common cause of acquired prominent eyes, there are many other causes such as high myopic globes, shallow orbits with congenital proptosis, and congenital hypoplasia of the maxilla/zygoma, among other causes [1,2].

In addition to esthetic issue of prominent eyes for the patient, the patient with a relatively prominent eye presents a challenge to the surgeon planning esthetic or reconstructive surgery of the periocular tissues. When the globe is prominent relative to the orbital bony support, the eyelids lose mechanical advantage, and there is a tendency toward scleral show, lagophthalmos, tear pump dysfunction with epiphora, and descent of the eyelid–cheek complex, especially if/when these patients undergo traditional blepharoplasty. These disproportionate soft tissue bony relationships produce similar problems whether the proptosis is related to Graves disease, other active orbital process, enlarged globes (high myopia, buphthalmos, and so forth), congenital shallow orbit with congenital proptosis, or congenital hypoplastic malar eminence with sclera show [3,4].

Eyelid camouflage procedures that address the soft tissues alone, such as lateral canthoplasty, lower eyelid retraction surgery, and orbital rim onlay implants, can be used to camouflage the globe prominence but they are prone to failure if the underlying globe–orbit dystopia is not addressed [3,4]. They are simply suboptimal compared to repositioning the globe appropriately within the orbital space. Osteotomy and bony advancement is a substantially invasive option with significant morbidity than could address the globe–orbit dystopia but is obviously not preferred. The gold standard for treating prominent eyes is orbital decompression surgery.

Orbital decompression has had a long historical association with Graves exophthalmos because it is used

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to recess the globe relative to its bony support. However, orbital decompression has been shown to be of functional and cosmetic benefit to relative proptosis of nonthyroid origin, such as congenital shallow orbits, enlarged globes (high myopia, buphthalmos, and so forth), and hypoplastic malar eminence with sclera show, by recessing the globe relative to its bony support [3,5–7]. Regardless of cause, (relative) proptosis can represent a disfiguring problem for the patient with potential functional sequel in the aging process, especially for those who elect to undergo cosmetic eyelid surgery in the future.

To the credit of orbital surgeons, orbital decompression surgery has advanced tremendously during several decades, and a number of philosophic and technical advances have coalesced to evolve the surgical management of prominent globes. That includes the indications for orbital decompression, the bony surfaces that are selected for removal, and the incisions that are used to gain access to the orbital cavity. Orbital decompression surgery has evolved from a very invasive transcranial approach (with high morbidity and complications) to transantral Ogura approach (with high incidence of hypoglobus and diplopia) to more advanced eyelid crease and transcaruncular approaches with less morbidity, less complications, and quicker healing [1–10].

As detailed in our earlier publication [1], orbital decompression helps patients with prominent eyes, whether due to thyroid eye disease or congenital shallow orbits or maxillary hypoplasia or other, because they are bothered both esthetically and functionally. Furthermore, patients desire less invasive procedures/techniques with quicker recovery. Herein, we describe the safety and efficacy of a modified (scarless) customized orbital decompression technique to reduce eye prominence.

Technique

Preoperative CT scan was only used in suspicious cases. Orbital decompression is performed in graded customized fashion, based on the bony anatomy, amount of relative proptosis, the desired goal, and dynamic result of the surgery. Surgical technique for this modified (scarless) bony orbital decompression included lower eyelid transconjunctival approach to the inferolateral orbit area (mainly zygomatic bone), surrounding the inferior orbital fissure (inferior, lateral, and superior to) with/without fat removal. The conjunctiva is incised half way between inferior fornix border of the tarsus. The conjunctiva/retractors are then placed on upward stretch to protect the globe during the procedure. The periorbita is opened using steven scissors with spreading technique. Bone is removed at along the lateral orbital wall and lateral floor [1,2]. The fat is removed using blunt and sharp dissection with careful preservation of the muscles with enough fat covering them; see Figs. 1 and 2 and surgical Video 1. If additional orbital space is needed, medial orbital wall and posterior strut and medial intraconal fat is removed, in graded fashion, using a transcaruncular approach [3]. Concurrent complimentary procedures (canthoplasty, infraorbital rim implants, and/or lower eyelid retraction surgery, periocular fat injection) are performed if deemed appropriate.

Inferolateral orbital decompression can expose the superior/lateral maxillary sinus, temporalis muscle, and buccal fat. Hemostasis is achieved much easier (with electrocautery and minimal bone wax use) with minimal blood loss.

In our experience, the average operative time for the modified inferiolateral orbital decompression is 26 minutes per eye. Additional transcaruncular orbital decompression would add about 20 minutes for each eye. The expected reduction in globe position (using Hertel's Exophthalmometer) is 3.2 mm (range 1.5–5 mm) for modified inferolateral orbital decompression and another 3 to 4 mm for medial orbital decompression.

Most patients can resume normal activities after 10 to 14 days with minimal residual visible edema/ecchymosis (greater edema/ecchymosis if concurrent lower eyelid retraction surgery also performed). See representative healing photo at 1 week postop in Fig. 3D.

See Figs. 3–5 for examples of patients who underwent scarless orbital decompression.

DISCUSSION

The concept of cosmesis is inherent to all oculoplastic surgery. Cosmesis is a Greek derived word, meaning

FIG. 1 Skull depicting the area of the bony orbital decompression (in pink) in the inferolateral orbit (which can be approached using lower eyelid transconjunctival dissection, with or without canthotomy).

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FIG. 2 Intraoperative bird's eye view depicting the retrodisplacement of the right globe immediately after inferolateral orbit bony and fat decompression (without canthotomy), contrasted to yet unoperated left side.

"relating to treatment intended to improve a person's appearance" or "improving only the appearance of something" [5], Cosmetic surgery aims at improving a "normal" appearance, whereas reconstructive surgery is performed to correct congenital or acquired defects, which adversely affect ocular function and/or social interaction. However, there is often a fine line between reconstructive and cosmetic oculoplastic surgery. For instance, eyelid ptosis surgery could be done as a reconstructive procedure if it meets certain visual criteria to improve peripheral vision or it could be done as an esthetic procedure. The decision to perform cosmetic eyelid ptosis procedure rests mainly on the patient's desires because "beauty is in the eye of the beholder." The same concept can be applied to most other cosmetic problems and procedures.

The gold standard for treating prominent eyes is orbital decompression surgery [1,3,5]. It also allows the lower eyelids to be elevated better/higher in those undergoing concurrent lower eyelid retractions surgery, whether at the same time or later [2]. Over the years, the threshold

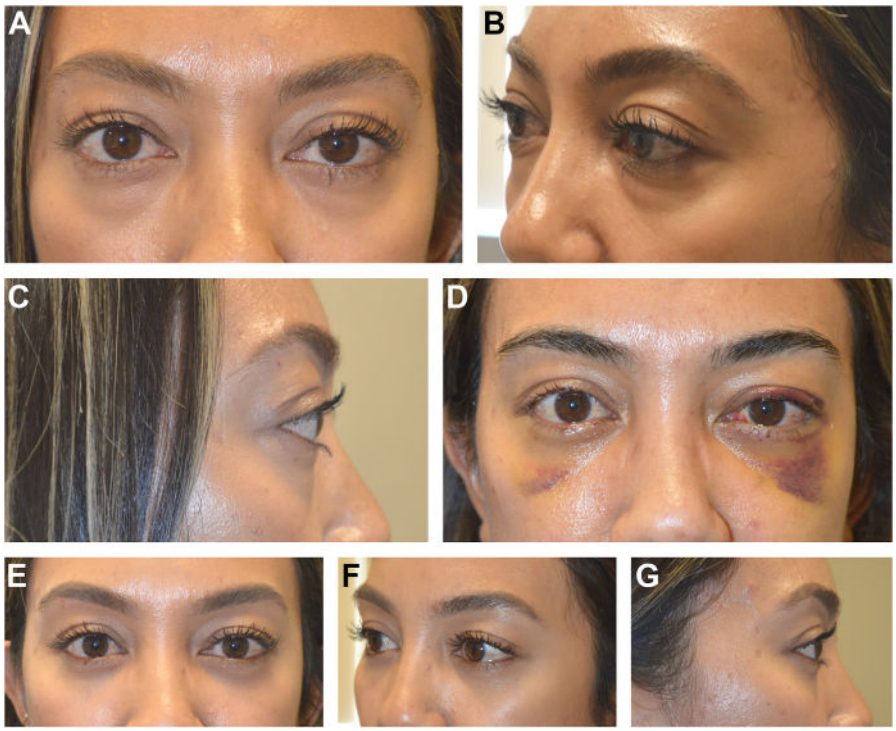

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FIG. 3 A 35-year-old woman, with Graves thyroid eye disease, underwent scarless transconjunctival inferolateral orbital decompression (without canthotomy) and lower blepharoplasty and left upper eyelid ptosis surgery. (*A–C*) Preoperative; (*D*) 1 week postop (more bruising/edema left upper eyelid since she had left ptosis surgery); and (*E–G*) 6 weeks postoperative photographs.

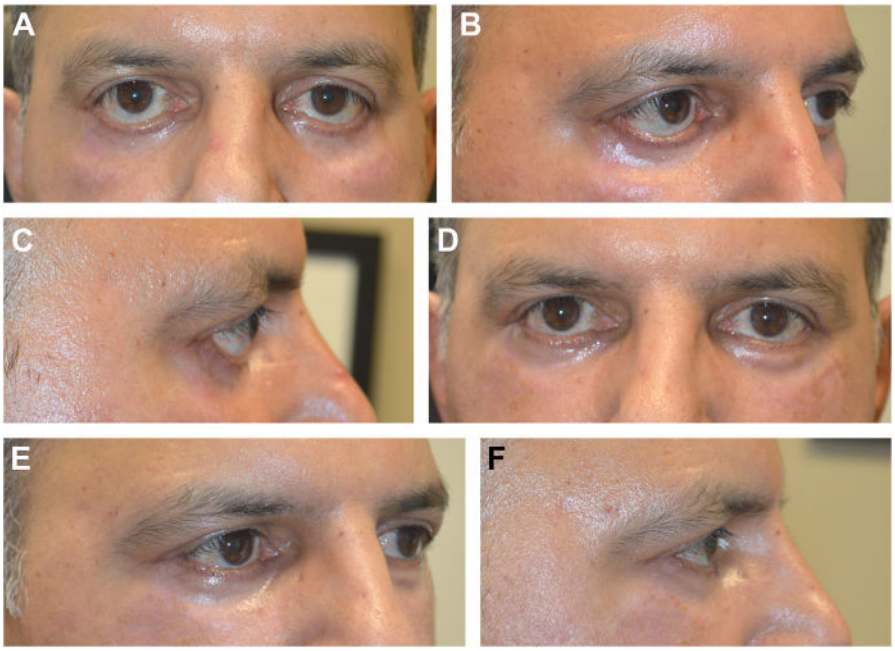

FIG. 4 A 51-year-old man, with postlower blepharoplasty lower eyelid retraction with genetic negative vector morphology, underwent concurrent inferolateral orbital decompression (with canthotomy) and lower eyelid retraction surgery. (*A–C*) Preoperative and (*D–F*) 3 months postoperative photographs.

for performing reconstructive orbital surgery for prominent globes in patients with Graves disease or patients without Graves disease has been lowered by public demand and evolving techniques [1,4]. We have demonstrated a modified (scarless) orbital decompression technique to reduce prominent eyes with significantly safer results and quicker recovery and shorter operative time. This method is purely scarless in those

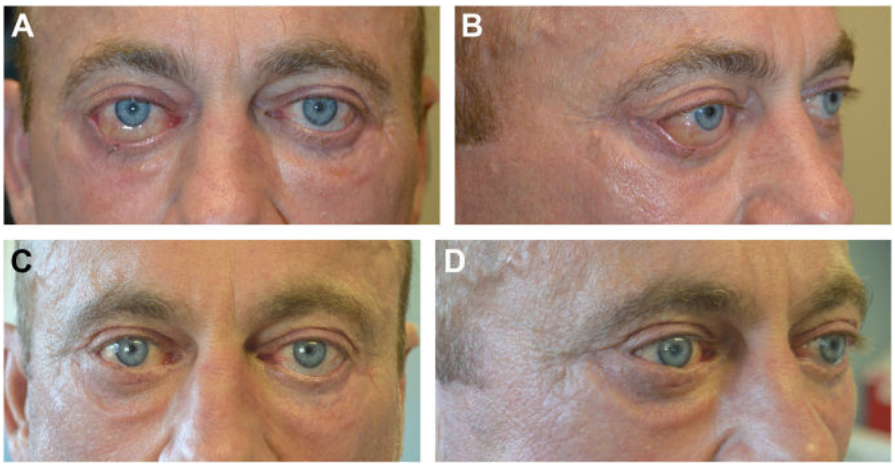

FIG. 5 A 53-year-old man, with severe postlower blepharoplasty lower eyelid retraction and chemosis with genetic negative vector morphology, underwent *right* concurrent inferolateral orbital decompression (with canthotomy) and lower eyelid retraction surgery with skin graft. (*A*, *B*) Preoperative and (*C*, *D*) 3 months postoperative photographs.

only undergoing inferolateral orbital decompression or it can have subtle lateral canthotomy scar in those undergoing concurrent lower eyelid retraction surgery and canthoplasty. This method can be combined with (scarless) medial wall orbital decompression, if necessary.

There are several important points that need to be discussed further here. Preoperative CT scan is not necessary (unless suspicious case) because the area of the bony and fat removal is very safe although each surgeon's experience and expertise should be considered. The inferolateral orbit bony removal can expose the lateral/superior maxillary sinus, temporalis muscle, and buccal fat, with no risk of dura/intracranial exposure, fovea ethmoidalis exposure, or cerebrospinal fluid (CSF) leak (of course, medial orbital decompression carries such risk). Diploe space is also avoided. Hemostasis is controlled much easier with minimal blood loss. Temporary numbness in the zygomaticofacial nerve distribution is common but permanent numbness is rare. Risk of ocular motility damage is also minimized with this technique. First, healthy orbits with normal extraocular muscles, as opposed to unhealthy orbits in thyroid eye disease with fibrotic extraocular muscles and fat, are expected to be less prone to ocular misalignment. Second, there is greater flexibility and space to maneuver in the orbit in healthy orbits as opposed to fibrotic orbits in thyroid eye disease with expected reduction in complication rates. Finally, there is less dissection and bleeding (and hence fibrous/healing reaction) using the modified technique as opposed to traditional transeyelid approach or other techniques.

As with any other procedure, patient selection along with surgeon's training, experience, and confidence are critical in achieving satisfactory results and minimizing complications. The decision to offer cosmetic orbital surgery should be based on the surgeon's confidence in his/her results and motivation to perform such surgery. The patient's psyche dominates his/her own motivation to have surgery and their response to surgical outcome [3,5]. Once a decision to offer surgery is made, the aims, limitations, and complications need to be clear and confirmed in writing. Patients must accept the rare risk for serious complications.

In conclusion, modified (scarless) orbital decompression technique can reduce eye prominence in thyroid and nonthyroid patients with shorter operative time and quicker recovery. Newer techniques and public demand have allowed such work to be done. Experience and expertise are critical in achieving safe results.

CLINICS CARE POINTS

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None.

PROPRIETARY INTERESTS

None.

SUPPLEMENTARY DATA

Supplementary data to this article can be found online at https://doi.org/10.1016/j.yacs.2023.10.007.

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