

**Evidence-based Clinical Practice Guideline: Eyelid Surgery for Upper Visual Field Improvement**

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## INTRODUCTION AND BACKGROUND

Upper lid surgery is one of the most commonly performed facial operations. People seek aesthetic enhancement when there is excessive upper lid skin. However, when the excess skin begins to weigh down the lid and obstructs upper visual fields (dermatochalasis), it becomes a functional operation, as it can hinder daily functions such as driving. Another functional condition of the upper lids which limits the upper fields of vision is blepharoptosis (eyelid ptosis / ptosis), which is a weakness of the levator muscle complex. Upper visual obstruction leads patients to chronically raise their foreheads which can subsequently cause eye strain, frontalis muscle compensatory hyperactivity, and forehead rhytides. According to the 2018 American Society of Plastic Surgeons (ASPS) Procedural Statistics report, eyelid surgery is the most commonly performed surgical procedure among those aged 55 years and over, and the 2<sup>nd</sup> most commonly performed facial surgery regardless of age (American Society of Plastic Surgeons, 2018). Medicare Part B claims data further reflects this prevalence, with 183,869 unique upper lid blepharoplasty, blepharoptosis repair, or brow ptosis repair reimbursed in 2018 (American Medical Association, 2018). Despite being a common surgery, upper eyelid surgery to correct upper visual field loss has a wide range of complications (from 2% to 10%) and revision rates highly dependent on surgical approach (from 1% to 72%) (Aheuro, Winn, & Sires, 2012; Ben Simon, Lee, Schwarcz, McCann, & Goldberg, 2005; Chang, Lehrman, Itani, & Rohrich, 2012; Chou, et al., 2018; McCulley, Kersten, Kulwin, & Feuer, 2003; Sohrab & Lissner, 2016; Spahiu, Spahiu, & Dida, 2008). In addition, there are several variations in practice which result in a gap in care and patient satisfaction.

One of the reasons for the varied practice patterns in surgery and the results lies in the etiology of upper visual field obstruction. It can simply be due to excess eyelid skin—dermatochalasis—or it can be more complex, involving weakness of the eyelid elevating levator muscle mechanism—eyelid ptosis. When the anterior lamella (skin and orbicularis muscle) or in conjunction with the middle lamella (orbital fat) of the eyelid hoods, it can be difficult to determine the underlying function of the posterior lamella (levator muscle and its components) of the eyelid. Another reason for inaccurate determination of the levator function is that during examination, a patient's voluntary mechanism (reflex mechanism of looking at an examiner or looking at a mirror) and involuntary mechanism (excitement or nervousness of the examination) can become activated to a point where the eyelid elevating function is temporarily enhanced. Another factor leading to difficulties in precise diagnosis is that eyelid asymmetry is more common with age. Each eye perceives its own range of visual field and sends separate afferent information to the brain. The brain then sends one efferent signal back to both eyes in an attempt to clear any visual field obstruction. The Hering's Law phenomenon affects the unobstructed eye and therefore adds a variable that can increase diagnostic problems and subsequent operative complications.

In cases where visual obstruction is due to hooding of the anterior lamella or anterior and middle lamella, the correction is relatively straightforward and involves removing the excess soft tissue. However, in cases where visual obstruction is due to inadequate eyelid elevating function, the methods of improving the levator function are varied. These differences include the initial approach of whether to operate from the anterior (skin) or posterior (conjunctiva) region or the specifics of whether the levator muscle components should be plicated or advanced. Furthermore, even the difference in anesthesia type, local or general anesthesia, used to perform the procedure has wide economic and patient safety implications that warrant investigation.

For these primary reasons, upper eyelid surgery for visual field loss has been determined to be one of the leading topics of interest for clinical practice guideline development by the Quality and Performance Measurement Committee (QPMC) and the leading members of the American Society of Plastic Surgeons

(ASPS). This guideline is an effort to evaluate the evidence in the literature to determine the recommended diagnostic and surgical approaches. The committee's work was a coordinated effort by the medical specialties of Plastic Surgery, Head and Neck Surgery, Ophthalmology, and their respective subspecialties involved in eyelid surgery to help surgeons improve diagnosis, surgical outcome, and patient satisfaction.

### **Scope and Intended Users**

This guideline provides evidence-based recommendations for correction of upper visual field obstruction. The workgroup recommends that the corrective surgery should be performed by surgeons trained and experienced in upper blepharoplasty and eyelid ptosis surgery. Neonatal and young pediatric ptosis cases (infancy to preadolescence) were excluded from this guideline. Other medical comorbidities causing neurogenic eyelid ptosis by itself or as a syndrome such as myasthenia gravis, aneurysms, tumors, and myelitis are also excluded from this guideline.

This evidence-based guideline is supported by a systematic review of evidence and specifically addresses the diagnosis and benefits of upper blepharoplasty or ptosis correction. This guideline is intended to be used by the surgeons that provide care for patients with upper visual field obstruction requiring upper eyelid surgery. Health care practitioners should evaluate each case individually, considering these evidenced-based recommendations along with patient medical conditions and preferences to determine the optimal treatment plan for each patient. This guideline is intended to serve as a resource for surgeons and developers of clinical practice guidelines and recommendations.

### **Disclaimer**

Evidence-based guidelines are strategies for patient management, developed to assist physicians in clinical decision-making. This guideline was developed through a comprehensive review of the scientific literature and consideration of relevant clinical experience and describes a range of generally acceptable approaches to diagnosis, management, or prevention of specific diseases or conditions. This guideline attempts to define principles of practice that should generally meet the needs of most patients in most circumstances.

However, this guideline should not be construed as a rule, nor should it be deemed inclusive of all proper methods of care or exclusive of other methods of care reasonably directed at obtaining the appropriate results. It is anticipated that it will be necessary to approach some patients' needs in different ways. The ultimate judgment regarding the care of a particular patient must be made by the physician in light of all the circumstances presented by the patient, the available diagnostic and treatment options, and available resources.

This guideline is not intended to define or serve as a standard of medical care. Standards of medical care are determined on the basis of all facts or circumstances involved in an individual case and are subject to change as scientific knowledge and technology advance and as practice patterns evolve. The recommendations in this guideline reflect the state of current knowledge at the time of publication. Given the inevitable changes in the state of scientific information and technology, this guideline will be considered relevant for a period of 5 years after publication, in accordance with the inclusion criteria of the ECRI Guidelines Trust.

## **METHODS**

### **Work Group Selection Process**

The guideline was led by the American Society of Plastic Surgeons (ASPS) with stakeholder input and representation from the American Academy of Facial Plastic and Reconstructive Surgery (AAFPRS), the American Society of Aesthetic Plastic Surgery (ASAPS), and the American Society of Ophthalmic Plastic and Reconstructive Surgery (ASOPRS).

All stakeholder organizations were invited to nominate members from their respective organizations to serve on the Work Group, following their own policies and procedures for addressing content expertise, guideline experience, and potential conflicts of interest. Initially, one patient representative was also included on the panel to provide insight related to patient values and preferences but was removed due to apparent conflicts of interest that later developed and did not participate in recommendation statement formation. A replacement patient representative was sought but a suitable candidate could not be found prior to the recommendation statement development meeting. An ASPS quality department staff member was assigned to manage the project and provide expertise in clinical practice guideline development methodology.

All applicants were required to submit an online conflict of interest disclosure form for membership consideration. The co-chairs were free of all conflicts of interest for the duration of the project, as required by ASPS policy.

### **Clinical Question Development**

Work Group members used a consensus-based approach to select the clinical questions to be addressed in this evidence-based guideline. Clinical questions were submitted via a blinded process to the ASPS project manager, who compiled and dispersed the clinical questions for consideration and discussion at the introductory meeting. The clinical question topics were then discussed in detail at the in-person introductory meeting with diverse representation from plastic surgery, otolaryngology, ophthalmology, and patients.

A total of 16 clinical questions were reviewed by the Work Group. Clinical questions were developed and selected based on the scope and importance to patient outcomes, as determined by the Work Group. The patient population for the guideline is adult patients with visual field impairment due to dermatochalasis, blepharoptosis, or a combination of both. Patient-related outcomes of interest were determined to be cosmetic appearance (including symmetry), rate of revision, surgical complications, visual field improvement (marginal reflex distance-1 improvement), quality of life (including patient satisfaction), and patient safety. The final 7 clinical questions below were chosen based on clinical relevance to the outcome of the surgery and patient satisfaction.

- 1) In adult patients with visual field impairment, how does physical examination alone (e.g. measurement of marginal reflex distance-1 (MRD-1) and levator function) compared to additional laboratory and/or other studies (e.g. peripheral visual field exam) help the surgeon correctly determine underlying etiology of the impairment and indications for specific surgical techniques/approaches?

- 2) In adult patients with visual field impairment undergoing ptosis repair (with or without blepharoplasty), how does anterior ptosis repair compared to posterior ptosis repair differ in lid margin correction, symmetry, cosmetic appearance, longevity of results, change in vision, complications, rate of revision, and quality of life?
- 3) In adult patients with unilateral visual field impairment, how does blepharoplasty compared to ptosis correction differ in lid margin correction, symmetry, cosmetic appearance, longevity of results, change in visual field, complications, rate of revision, and quality of life?
- 4) In adult patients with unilateral visual field impairment, how does unilateral compared to bilateral surgical intervention differ in lid margin correction, symmetry, cosmetic appearance, longevity of results, change in visual field, complications, rate of revision, and quality of life?
- 5) In adult patients with visual field impairment undergoing upper eyelid blepharoplasty and/or ptosis correction (without concomitant procedures), how does general anesthesia compared to local anesthesia differ in patient satisfaction, complications, cost, and visual field improvement?
- 6) In adult patients with visual field impairment undergoing eyelid surgery, how does upper eyelid blepharoplasty and ptosis correction with brow surgery versus without brow surgery differ in patient satisfaction, complications, rate of revision, cost, visual field improvement, and quality of life?
- 7) In adult patients with visual field impairment undergoing blepharoptosis surgery, how does levator plication compared to levator advancement differ in lid margin correction, symmetry, longevity of results, change in visual field, complications, rate of revision, and quality of life?

### Literature Search

Multiple literature searches were performed during 2018 to identify relevant studies published from 1990 to 2018. The initial search dates were January 1, 1980 through April 16, 2018, with a subsequent updated and final search on November 2, 2018. Electronic searches of PubMed, Embase, and Cochrane Central Register of Controlled Trials (CENTRAL) were performed using appropriate combinations of the following MEDLINE Medical Subject Headings (MeSH) terms and keywords, as permitted by the search functionalities of each database/journal:

- MeSH terms (used in PubMed only): "Visual Fields"[MeSH], "Blepharoptosis"[MeSH], "Blepharoplasty"[MeSH], "Eyelids/surgery"[MeSH]
- Keywords: Visual field(s), field of vision, visual hemifield(s), impairment(s), drooping, weakness, ptosis, ptoses, prolapse, blepharoptosis, blepharoptoses, palpebra, eyelid, brow, upper lid, levator, reconstruction, correction, repair, tarsoplasty, eyelid reconstruction, eyelid surgery

Initial study selection for each clinical question was performed by two reviewers with a multi-level screening process. Level I screening involved title and abstract review to identify potentially relevant studies for inclusion in level II screening. Level II screening was full-text review of articles to confirm relevance given the inclusion/exclusion criteria below:

#### Inclusion Criteria:

- Published since 1980 (01/01/1980 – 11/02/2018)

- English language
- Reported a meta-analysis/systematic review, RCT, prospective or retrospective cohort/comparative, case-control, or case series
- Reported outcomes of interest for clinical questions
- Included at least 20 patients per study and/or per arm of study
- Human subjects

Relevant clinical practice guidelines and systematic reviews underwent a separate bibliographic screening, as a cross-reference to ensure no relevant literature was excluded during the search process. These articles were screened as described above. Duplicate articles were eliminated. Studies meeting inclusion criteria were assessed for methodologic quality, as described below. Excluded studies and their reasons for exclusion were documented for review by the Work Group to confirm the final rejection or reconsider the study for inclusion. See Appendix for details.

Additional references were included in this review if considered necessary for background or discussion; however, these references were not critically appraised or used in the development of recommendation statements.

### **Critical Appraisal of Evidence**

A modified version of the GRADE (Grading of Recommendations Assessment, Development, and Evaluation) process was used to evaluate the methodologic quality of clinical studies and the strength of clinical evidence for the purposes of developing clinical practice guidelines and performance measures. GRADE determines the quality of evidence across outcomes rather than assessing each study individually. The quality of evidence for each outcome is initially determined by study design. The evidence from randomized controlled trials (RCTs) is assigned as high-quality evidence, while evidence from observational studies begin as low quality. From there, high quality evidence can be downgraded, and low-quality evidence can be graded up or down based on the following: risk of bias; publication bias; imprecision related to the estimate of effect; inconsistency across studies; and indirectness related to the clinical questions. Studies with <10% of the population between the ages of 16 and 18 were included but downgraded as indirect evidence.

### **Grading of Recommendations**

Clinical practice recommendations were developed using BRIDGE-wiz (Building Recommendations in a Developers' Guideline Editor) software (Shiffman, Michel, Rosenfeld, & Davidson, 2012) (with consideration of the following 4 factors: 1) level of evidence (study quality); 2) assessment of benefits versus harms; and 3) patient preferences; 4) feasibility. Work Group members participated in several rounds of revisions until unanimous consensus was achieved for each recommendation statement. Each recommendation in this guideline is accompanied by a grade indicating the strength of the recommendation, which was determined by considering the overall level of evidence supporting the recommendation and the judgment of the guideline developers.

**Table 1.** ASPS Strength of Recommendation Description

Strength	Overall Strength of Evidence	Description
<b>Strong</b>	Strong	Evidence from two or more “High” quality studies with consistent findings for recommending for or against the intervention. Benefit or harm predominates. The vast majority of well-informed patients (> 90%) would most likely <i>use or not use</i> this patient-care strategy, compared to alternative patient-care strategies or no treatment.
<b>Moderate</b>	Moderate	Evidence from two or more “Moderate” quality studies with consistent findings, or evidence from a single “High” quality study for recommending for or against the intervention. Benefit or harm predominates. The majority of well-informed patients would most likely <i>use or not use</i> this patient-care strategy, compared to alternative patient-care strategies or no treatment.
<b>Weak</b>	Low Strength Evidence or Inconsistent Evidence	Evidence from one or more “Low” quality studies with consistent findings or evidence from a single “Moderate” quality study recommending for or against the intervention. Benefit or harm predominates or is unclear. The majority of well-informed patients would most likely <i>use or not use</i> this patient-care strategy, compared to alternative patient-care strategies or no treatment.
<b>Option</b>	Very Low Strength Evidence or Inconsistent Evidence	Evidence from one or more “Very Low” quality studies with consistent findings or evidence from a single “Weak” quality study recommending for or against the intervention. Potential benefits are harms are balanced. The majority of well-informed patients would most likely <i>use or not use</i> this patient-care strategy, compared to alternative patient-care strategies or no treatment.

### Peer Review and Public Comment Process

The draft guideline was peer reviewed by the American Society of Plastic Surgeons, the American Academy of Facial Plastic and Reconstructive Surgery (AAFPRS), the American Society of Aesthetic Plastic Surgery (ASAPS), and the American Society of Ophthalmic Plastic and Reconstructive Surgery (ASOPRS). Peer Reviewers were invited to review and provide feedback on the validity, generalizability, and clarity of the draft guideline using the Appraisal of Guidelines for Research & Evaluation Global Rating Scale (AGREE-GRS) instrument, as well as asked to review the clinical content and attest to either support, support with modifications, or do not support the individual recommendations. The draft guideline was posted on the ASPS website for a 30-day public comment period from 10/05/2019 until 11/04/2019, as well as distributed through the Council of Medical Specialty Societies (CMSS) Clinical Practice Guidelines email distribution list.

### Guideline Approval Process

After the peer review and public comment process, the guideline draft was reviewed and modified by the Work Group after consideration of peer review and public comments. **The final guideline was approved by [EACH SOCIETY] Executive Committees during their Month 20XX, Month 20XX, etc. meetings.** (To be updated after public comment closes)

### Plan for Updating Guideline

In accordance with the inclusion criteria of the ECRI Guidelines Trust, this guideline will be updated within 5 years or in the event when newly published evidence may result in a change to current recommendations. ASPS uses a digital platform (P.E.E.R.) to store literature and data, thereby facilitating an efficient updating process.

## **RESULTS**

A total of 4,675 references were identified from databases; 3,354 were screened after excluding duplicate records. After screening and critical appraisal were performed, 40 studies were selected for final review for this guideline (see Appendix). 22 of these studies were appraised as very low quality. The recommendations listed below were based on 18 studies of high, moderate, and low-quality evidence.

A summary of recommendation statements is shown in Table 14.

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**RECOMMENDATIONS**

**Recommendation 1:**

The Work Group recommends that for patients presenting with low upper eyelid position obstructing upper visual field, clinicians obtain the following:

A clinical history, which should include an assessment of impact on visual field or activities of daily living (ADL);

**AND** perform a physical exam to assess upper eyelid position relative to the pupil. The exam should differentiate whether the cause of the visual field obstruction is due to excess skin (dermatochalasis) or due to low position of the eyelid margin (blepharoptosis). The marginal reflex distance (MRD-1) and the levator function should be assessed. Photograph of the eyelid should be taken.

Evidence quality: Moderate Quality

Recommendation strength: Moderate Recommendation

**Table 2.**

Benefits	<ul style="list-style-type: none"> <li>• Accurate diagnosis</li> <li>• Helps surgeon plan treatment strategy</li> <li>• Provides documentation of problem</li> </ul>
Risks, Harms, and Costs	<ul style="list-style-type: none"> <li>• Increases physician/staff time</li> <li>• Potential additional cost to patient, especially if additional diagnostic exams are determined to be necessary</li> </ul>
Benefits/ Harms Assessment	<ul style="list-style-type: none"> <li>• Preponderance of Benefit</li> </ul>
Value Judgments	None
Intentional Vagueness	Did not define specific measurement to include in an exam to assess upper eyelid position relative to pupil (i.e. MRD-1 measurement); did not define specific type of photographic documentation, such as angles or image technical specifications; did not specify a particular assessment or measurement for levator function (left to surgeon discretion)
Role of Patient Preference	None
Exclusions	Cosmetic ptosis patients (i.e. those desiring surgery whose eyelids do not preoperatively obstruct their visual field)
Differences of Opinion	None

## Rationale

The initial patient evaluation should include general medical and periorbital history. A detailed medical and focused history should document elements of previous eye and eyelid surgery, cardiac and chronic illness, bleeding disorders, medications and smoking. Specific history elements include presence of dry eyes, glaucoma, the need for glasses, trauma, allergies, excess tearing. According to Drolet and Sullivan (Drolet & Sullivan, 2014), a patient presenting for revision procedure will need additional counseling. We recommend the history should include an assessment of impact of the condition on visual field or activities of daily living.

A physical examination should be performed. The eye examination should consist of basic visual acuity, extraocular muscle and pupil evaluation, and Bell's phenomenon for corneal protection. Whether or not skin removal for dermatochalasis is required should be determined. The upper lid margin normally covers 2 mm of the iris upon primary gaze. A lower position may indicate blepharoptosis, which needs to be addressed preoperatively. We recommend the eyelid position should be determined relative to pupil or corneal light reflex upon primary gaze and in a restful state to avoid a sympathetic effect on Mueller's muscle. The resultant margin reflex distance (MRD-1) should be noted. The normal value ranges between 4.0 and 4.5 mm. However, this range is variable based on the size of the iris and the overall eye of the patient, and for this reason the work group did not set defined cutoff values. Ptosis in conjunction with a high tarsal fold may be indicative of levator dehiscence. However, patients with prior blepharoplasty may have iatrogenically high supratarsal fold. The position and shape of the brow needs to be assessed. The other method of evaluating the levator muscle is determined by maximum eyelid excursion or levator function (Berke, 1952; Johnson, 1954). Levator function should also be assessed by the excursion of the upper lid from downgaze to upgaze, without the contribution of the frontalis muscle. Studies demonstrate that MRD-1 is correlated with levator function (Pereira, Hwang, Kersten, Ray, & McCulley, 2008). In general, mild ptosis is associated with slightly diminished but acceptable levator function (>8 mm), moderate ptosis with compromised levator function (5-7 mm) and severe ptosis with minimal to no levator function (0-4 mm).

The presence of lagophthalmos and lid lag should also be assessed, documented, and considered in determining surgery. Preoperative assessment of the type or severity of blepharoptosis may help plan the type of blepharoptosis correction (i.e. levator plication, resection, frontalis suspension, or anterior or posterior approach) and the degree of correction.

Thorough evaluation supported by standardized photography should be obtained in each case and documented.

**Recommendation 2A**

**The Work Group suggests that surgeons not perform blepharoplasty alone (i.e. without ptosis correction) for patients presenting with diagnosed blepharoptosis.**

**Evidence Quality: Low Quality**

**Recommendation Strength: Weak Recommendation**

**Table 3.**

Benefits	<ul style="list-style-type: none"> <li>• Lower rate of revision</li> <li>• Higher patient satisfaction</li> <li>• Effective in improving upper visual field deficit</li> </ul>
Risks, Harms, and Costs	<ul style="list-style-type: none"> <li>• Longer operative time</li> <li>• Increased technical difficulty of procedure</li> <li>• Higher risk of overall complications (due to procedure invasiveness)</li> </ul>
Benefits/ Harms Assessment	<ul style="list-style-type: none"> <li>• Preponderance of Benefit</li> </ul>
Value Judgments	None
Intentional Vagueness	None
Role of Patient Preference	Recommendation may not apply to patients with mild ptosis (not specifically defined). Blepharoplasty is a less invasive procedure and may satisfy needs of patients with mild blepharoptosis conditions.
Exclusions	None
Differences of Opinion	None

**Recommendation 2B**

The Work Group suggests that surgeons perform concurrent upper eyelid blepharoplasty and ptosis correction in patients presenting with dermatochalasis and blepharoptosis.

**Evidence Quality: Low Quality**

**Recommendation Strength: Weak Recommendation**

**Table 4.**

Benefits	<ul style="list-style-type: none"> <li>• Lower rate of revision</li> <li>• Higher patient satisfaction</li> <li>• Effective in correcting improving upper visual field deficit</li> <li>• Effective in addressing both presenting issues</li> </ul>
Risks, Harms, and Costs	<ul style="list-style-type: none"> <li>• Increased risk of surgical complications</li> <li>• Longer operative time</li> </ul>
Benefits/ Harms Assessment	<ul style="list-style-type: none"> <li>• Preponderance of Benefit</li> </ul>
Value Judgments	None
Intentional Vagueness	None
Role of Patient Preference	None
Exclusions	None
Differences of Opinion	None

**Recommendation 2C**

**The Work Group suggests that surgeons perform upper eyelid blepharoplasty in patients presenting with dermatochalasis without underlying ptosis.**

**Evidence Quality: Low Quality**

**Recommendation Strength: Weak Recommendation**

**Table 5.**

Benefits	<ul style="list-style-type: none"> <li>• Shorter operative time</li> <li>• Decreased complication rates</li> <li>• Increased patient satisfaction</li> </ul>
Risks, Harms, and Costs	None
Benefits/ Harms Assessment	<ul style="list-style-type: none"> <li>• Preponderance of Benefit</li> </ul>
Value Judgments	None
Intentional Vagueness	None
Role of Patient Preference	None
Exclusions	None
Differences of Opinion	None

**Rationale**

Dermatochalasis or excess eyelid skin is a common condition. It results from progressive age-related changes in the periocular soft tissue. Gravity and connective tissue (collagen) weakness over time leads to loss of skin elasticity and sagging of the eyelid. The overall prevalence of dermatochalasis among individuals over age 45 is 16% and more frequent in male patients (Jacobs, et al., 2014). Blepharoplasty is a common procedure for rejuvenation of upper eyelids in patients presenting with dermatochalasis. Acquired blepharoptosis involves eyelid drooping caused by a thinning or detachment of the levator aponeurosis. It can also be due to progressive weakness of the levator palpebrae superioris muscle. For a successful surgical outcome, preexisting blepharoptosis needs to be identified, discussed, and properly addressed pre-operatively.

Blepharoplasty and blepharoptosis are distinct operations with specific indications. Studies have confirmed that either surgery, when indicated, leads to measurable improvement in function and alleviation of symptoms (Federici, Meyer, & Lininger, 1999; Jacobsen, Brost, Vorum, & Hargitai, 2017). Considering blepharoplasty is less invasive, it may be adequate in patients presenting with minimal to mild blepharoptosis, as previously defined. However, in patients presenting with moderate to severe blepharoptosis it is recommended that the two surgeries be combined to reduce revision rates, improve visual field, and increase patient satisfaction. There are few outcomes studies comparing benefits of blepharoplasty alone versus combined with blepharoptosis surgery (Ben Simon, Lee, Schwarcz, McCann, & Goldberg, 2005).

A low-quality outcome study compared blepharoplasty with skin excision only to blepharoplasty with simultaneous ptosis correction for senile or subclinical ptosis in Asians (Park & Park, 2017). Palpebral fissure improvements were more significant in the joint blepharoplasty and ptosis correction group. Simultaneous ptosis correction included either levator aponeurosis plication (in patients with good or fair levator function) or levator advancement/Muller muscle and aponeurosis composite flap advancement. Blepharoplasty only patients (n=20) had an overall increase in their postoperative MRD1 of +0.71 mm ( $p < 0.05$ ). MRD-1 changes were more significant in patients who underwent blepharoplasty with simultaneous ptosis correction (+1.22 mm, n=55). There was also a higher percentage of corneal exposure area in the combined group postoperatively (+11.4% vs. +19.9%). However, pre-operative MRD1 measurements were markedly higher in the blepharoplasty-only cohort, indicating a milder condition than those who were selected for ptosis correction. The study did report a higher rate of under-correction (e.g. some patients still left with visual obstruction after initial operation) in patients undergoing simultaneous repair, but a greater improvement of visual field correction was found in this combined group. This rate of undercorrection was not significantly different from another published cohort of patients receiving both blepharoptosis correction and upper eyelid blepharoplasty (Chou, et al., 2018). Therefore, the work group found this rate to be acceptable for routine procedures.

There are several low- to very low-quality papers evaluating postoperative changes, pitfalls, and complications following blepharoplasty combined with blepharoptosis repair. A study by Rymer (n=46, 2017) compared effects of blepharoplasty alone or in conjunction with Müller's muscle-conjunctival resection (MMCR) for ptosis repair on ocular surface scores or dry eye symptoms (Rymer, Marinho, Cagliari, Marafon, & Procianny, 2017). In this study addition of MMCR for ptosis correction to upper eyelid blepharoplasty did not worsen ocular surface scores or dry eye symptoms. Brown and Putterman (Brown & Putterman, 2000) studied the postoperative eyelid effects of upper blepharoplasty concomitantly performed with Müller muscle-conjunctival resection versus Müller muscle-conjunctival resection only. They determined that the combined procedure reduced the anticipated postoperative eyelid elevation by as much as 1 millimeter compared to Müller muscle-conjunctival resection only.

A low-quality study (Kim, In, & Jang, 2016) tracked changes in corneal curvature, using corneal topography, after upper eyelid surgery. The study concluded that repositioning of the upper eyelid after levator resection showed greater changes of corneal curvature than blepharoplasty. Significant advancement of the levator aponeurosis or the aponeurosis-Mueller complex, compared to minor advancement or plication, may have a greater effect on three-dimensional shape of the corneal lens. The mechanism may be due to changing the pressure where the lid rests against the cornea. They suggest that patients with blepharoptosis or dermatochalasis who intend to undergo cataract or refractive surgery in the future should consider first undergoing ptosis surgery to avoid any additional refractive changes.

Eyelid sensation after supratarsal lid crease incision was evaluated in another study (Black, Gladstone, & Nesi, 2002). Loss of skin sensation in the eyelid after upper eyelid crease incision blepharoplasty or blepharoptosis repair occurs in most patients and should be considered an expected outcome of the procedure. Partial to complete recovery of eyelid sensation over 2 to 6 months should also be expected, though in rare instances this does not occur. Tucker and Cabral found the incidence of lagophthalmos after levator aponeurosis ptosis repair to be 60% on first postoperative day and decreasing to 11% at six to twenty weeks (mean of 11 weeks and 0.6 mm lagophthalmos) (Tucker & Cabral, 2000).

A low-quality study evaluated long-term tear volume changes after blepharoptosis surgery and blepharoplasty (Watanabe, et al., 2014). The authors found that tear volume was not decreased after blepharoplasty but was decreased after blepharoptosis correction for at least 6 months, especially in cases with an initially high tear volume. Lee and colleagues (Lee, Lee, Lee, Park, & Baek, 2012) evaluated changes in brow position after upper blepharoplasty versus levator advancement in Asians (MRD-1 of +1.91 mm versus +0.20 mm). They found that the change in brow height was greater after levator advancement than after blepharoplasty. Their study implies that the possibility of change in postoperative brow position (drop in brow position) should be explained to patients before surgery, particularly in blepharoptosis patients undergoing ptosis correction.

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**Recommendation 3A**

The Work Group recommends that surgeons should perform anterior ptosis correction for patients diagnosed with severe upper eyelid ptosis.

**Evidence Quality: Moderate Quality**

**Recommendation Strength: Moderate Recommendation**

**Table 6. Perform anterior ptosis correction**

Benefits	<ul style="list-style-type: none"> <li>• Lower risk of infection, dehiscence, corneal abrasion, and hemorrhage</li> <li>• Greater effectiveness in resolving visual field impairment than posterior approach</li> </ul>
Risks, Harms, and Costs	<ul style="list-style-type: none"> <li>• Longer operative time</li> <li>• Technically difficult</li> <li>• Longer recovery times</li> <li>• Potential risk of donor site complications/morbidity</li> <li>• May require a sling, which includes autologous or non-autologous material</li> <li>• Theoretical increase in lid contour deformity and lagophthalmos</li> </ul>
Benefits/ Harms Assessment	<ul style="list-style-type: none"> <li>• Preponderance of Benefit</li> </ul>
Value Judgments	None
Intentional Vagueness	Did not define a specific anterior technique or severity of ptosis (see recommendation 1)
Role of Patient Preference	None
Exclusions	None
Differences of Opinion	None



**Recommendation 3B**

**It is an option for surgeons to perform either anterior or posterior ptosis correction for patients diagnosed with mild or moderate upper eyelid ptosis.**

**Evidence Quality: Moderate Quality**

**Recommendation Strength: Option**

**Table 7. Anterior approach**

Benefits	<ul style="list-style-type: none"> <li>• Lower risk of infection, dehiscence, corneal abrasion, and hemorrhage</li> <li>• Lower risk of lagophthalmos or overcorrection</li> <li>• Surgeon is able to address any dermatochalasis through same incision</li> </ul>
Risks, Harms, and Costs	<ul style="list-style-type: none"> <li>• Longer operative time</li> <li>• Increased risk of eyelid contour asymmetry or undercorrection</li> <li>• Increased revision rates</li> <li>• Technically more difficult</li> </ul>
Benefits/ Harms Assessment	<ul style="list-style-type: none"> <li>• Balance of Benefits and Harms</li> </ul>
Value Judgments	Surgeon proficiency/experience with approach
Intentional Vagueness	Did not define mild or moderate ptosis; did not define a specific anterior or posterior technique
Role of Patient Preference	Moderate; if surgeon is proficient in both techniques, benefits and harms of each approach should be discussed with patient
Exclusions	None
Differences of Opinion	None

**Table 8. Posterior Approach**

Benefits	<ul style="list-style-type: none"> <li>• Decreased risk of eyelid contour asymmetry</li> <li>• Shorter operative time</li> <li>• Lower revision rates</li> <li>• No externally visible scar</li> </ul>
Risks, Harms, and Costs	<ul style="list-style-type: none"> <li>• Require additional anterior incision in patients with concomitant dermatochalasis</li> <li>• Decrease ability of intraoperative adjustment of lid height change</li> <li>• Increased risk of hemorrhage, infection, corneal abrasion</li> </ul>

Benefits/ Harms Assessment	<ul style="list-style-type: none"> <li>Balance of Benefits and Harms</li> </ul>
Value Judgments	Surgeon proficiency/experience with approach
Intentional Vagueness	Did not define mild or moderate ptosis; did not define a specific anterior or posterior technique
Role of Patient Preference	Moderate; if surgeon is proficient in both techniques, benefits and harms of each approach should be discussed with patient
Exclusions	None
Differences of Opinion	None

## Rationale

This conditional recommendation has moderate quality evidence. It is based on a randomized controlled trial which showed equally effective outcomes from anterior (via skin incision) levator aponeurosis advancement or plication versus posterior (via conjunctival incision) Müller muscle–conjunctival resection on patients with mild or moderate ptosis (Saonanon & Sithanon, 2018). The panel agrees with Chou et al. that the benefits of the anterior approach over the posterior include a lower risk of infection, low risk of dehiscence, and hemorrhage, and less corneal abrasion compared to the posterior approach (Chou, et al., 2018). With the anterior approach any dermatochalasis can also be corrected through the same incision. In cases of unilateral ptosis, the risk of asymmetry was less with posterior approach ptosis repair. The posterior approach has a shorter operative time, lower revision rate with no externally visible scar. Risks of the anterior procedure are longer operative time and higher revision rates with externally visible scars (Ben Simon, Lee, Schwarcz, McCann, & Goldberg, 2005; Chou, et al., 2018; Saonanon & Sithanon, 2018).

In a retrospective, consecutive cohort study, the overall revision rate for all patients was 8.7% (Chou, et al., 2018). Of the posterior group, 6.8% required ptosis revision; of the anterior group, 9.5% required revision surgery although those who underwent anterior approach correction did have more severe ptosis pre-operatively. The main reason for ptosis revision surgery was under-correction of one or both eyelids. However, multivariable logistic regression for predictive factors showed that, when adjusted for gender and concurrent blepharoplasty, the revision rate in anterior-approach ptosis surgery is higher than posterior-approach ptosis surgery likely due to the rate of undercorrection (odds ratio = 2.08;  $p = 0.002$ ). Disadvantages of the posterior approach include the inability to access any dermatochalasis, a higher risk of infection, and the possibility of hemorrhage and corneal abrasion. However, the study by Ben Simon et al. showed that the posterior approach yielded a better eyelid contour than the anterior approach (Ben Simon, Lee, Schwarcz, McCann, & Goldberg, 2005).

The Work Group determined the literature to show a balance of benefits and harms between the two surgical approaches for cases of mild to moderate blepharoptosis. Therefore, should a surgeon be proficient in either approach, the benefits and harms of both should be discussed with the patient and weight should be given to patient preferences and individual circumstances before an operative technique is decided.

In cases of severe blepharoptosis, the Work Group found the anterior approach led to superior outcomes in visual field improvement and decreased surgical complications as well as decreased risk of lagophthalmos or overcorrection (Chou, et al., 2018; Thomas, Chan, Sundar, & Amrith, 2017; Ben Simon, Lee, Schwarcz, McCann, & Goldberg, 2005). The anterior approach for severe blepharoptosis includes

frontalis suspension with graft, levator muscle complex advancement, and conjoint fascial sheath advancement.

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#### **Recommendation 4**

##### **No evidence found**

The work group was interested in better understanding Hering's Law and the possible need for bilateral surgical intervention when a patient presents with a unilateral visual deficit. However, we were unable to find any head-to-head studies which compared unilateral to bilateral surgical intervention that met the inclusion criteria, and we are unable to make a literature supported recommendation for this clinical question. However, relying on their cumulative clinical experience and the principles of plastic surgery (including Hering's Law) the work group consensus was that surgeons should be operating on a contralateral upper lid to obtain relative symmetry in cases where one lid is significantly different. Some very-low quality case series studies supported this judgement (Aheuro, Winn, & Sires, 2012; Bodian, 1982; Erb, et al., 2004). When stratified by repair type (i.e. unilateral vs. bilateral), bilateral ptosis repair yielded a more symmetrical outcome than unilateral ptosis repair, quantified by a lower mean difference in MRD-1 values between eyelids (Aheuro, Winn, & Sires, 2012).

The eyelids are perceived as a pair existing in relative symmetry. Identical appearance on contralateral sides of the body is rare. However, after an injury or disease process alters a single side, gross asymmetry may occur. Cases of induced, contralateral blepharoptosis have also been reported in unilateral blepharoptosis correction alone (Zoumalan & Lisman, 2010; Bodian, 1982; Erb, et al., 2004). This may mandate a corrective surgery on the side contralateral to the initially operated side. Additionally, ptosis severity plays a role, with a more severe ptosis likely increasing the chance of the contralateral eyelid being affected. Therefore, to preemptively avoid this postoperative change in the unaffected eyelid, performing a bilateral eyelid surgery may remediate changes and complications arising from the effect of Hering's Law. However, if the experienced surgeon can accurately predict the postoperative change of the contralateral eyelid when operating on the ptotic eyelid, then it is generally acceptable to operate only unilaterally.

Although out of scope of this guideline it is reasonable to extend the physiological implications of Hering's Law to cases secondary to trauma, tumor excision, facial paralysis, or other such injury. Well-designed head-to-head studies comparing outcomes for both unilateral and bilateral interventions, especially the need for reoperation, could allow future work groups to make a recommendation for this question.

**Recommendation 5**

**The Work Group suggests that surgeons may use local anesthesia for patients presenting for upper eyelid ptosis correction and/or blepharoplasty.**

**Evidence Quality: Low Quality**

**Recommendation Strength: Weak Recommendation**

**Table 9. Use of local anesthesia**

Benefits	<ul style="list-style-type: none"> <li>• Patients do not have to fast</li> <li>• Easier recovery time</li> <li>• Decreased cost</li> <li>• Lower complications from side effects associated with general anesthesia</li> <li>• More flexibility in surgical setting</li> <li>• Intraoperative assessment of eyelid position and function is possible</li> </ul>
Risks, Harms, and Costs	<ul style="list-style-type: none"> <li>• Possible increased patient anxiety</li> <li>• Need for patient cooperation in awake state</li> </ul>
Benefits/ Harms Assessment	<ul style="list-style-type: none"> <li>• Preponderance of Benefit</li> </ul>
Value Judgments	None
Intentional Vagueness	Did not specify a type of local anesthesia, but defines local broadly based on an ability for patient intraoperative awareness and cooperation
Role of Patient Preference	Moderate; risks and benefits should be explained to the patient ahead of surgery
Exclusions	None
Differences of Opinion	None

**Rationale**

Surgical procedures for adults with visual field impairment who undergo blepharoplasty and/or ptosis correction will require some sort of anesthesia, namely local anesthesia or general anesthesia. There is weak direct support by the literature that local anesthesia results in better patient satisfaction and a reduction in complications (Eshraghi & Ghadimi, 2018). Indirect literature did not often differentiate between the types of local anesthetics used. Subcutaneous infiltration of lidocaine and epinephrine were frequently chosen for both anterior and posterior repairs (Saonanon & Sithanon, 2018; Kim, In, & Jang, 2016) with some authors reporting additional use of bupivacaine, hyaluronidase, or topical tetracaine drops (Tucker & Cabral, 2000; McCulley, Kersten, Kulwin, & Feuer, 2003). Using local anesthesia for ptosis repair allows for intraoperative patient cooperation which may result in better intraoperative assessment of eyelid position and is a benefit of this modality compared to general

anesthesia. As well, local anesthesia has fewer side effects such as postoperative nausea and faster overall recovery times. Disadvantages to local anesthesia include increased discomfort, anxiety, and increased awareness which may cause distress to the patient. For upper eyelid surgery, preliminary evidence to support one type of anesthesia over the other was confounded by inclusion of pediatric patients which may predominately undergo a procedure under general anesthesia (Eshraghi & Ghadimi, 2018). The surgical approach (i.e. anterior or posterior repair) may be influenced by the degree of eyelid ptosis and thus dictate the type of anesthesia used, evidenced by the higher (albeit small) proportion of posterior repair cases done under general anesthesia compared to anterior repair cases (Chou, et al., 2018). The evidence may be confounded as surgical results and patient satisfaction are related more so to the degree of upper visual field deficit correction rather than the type of anesthesia administered. Although intravenous sedation anesthesia can also be used, this type of anesthesia was not directly compared to general anesthesia or local anesthesia in any of the literature. Studies that did include IV sedation in their protocol used a combination of midazolam, fentanyl, and propofol at injection only in order to still make intraoperative adjustments with the patients cooperation (Tucker & Cabral, 2000; McCulley, Kersten, Kulwin, & Feuer, 2003) The evidence anecdotally supports the recommendation that surgeons may use local anesthesia for patients presenting for upper eyelid ptosis correction and/or blepharoplasty. However, we defer to the American Society of Anesthesiologist (ASA) guidelines on moderate procedural sedation and their Continuum of Depth of Sedation standards of more specific indications for analgesia modality (American Society of Anesthesiologists, 2018).

**Recommendation 6**

**It is an option for surgeons to perform adjunctive brow surgery in patients presenting with dermatochalasis and co-existing brow and upper eyelid ptosis.**

**Evidence Quality: Low Quality**

**Recommendation Strength: Option**

**Table 10.**

Benefits	<ul style="list-style-type: none"> <li>• Lower revision rate</li> <li>• Better position of eyebrows</li> <li>• May improved visual field</li> <li>• Improvement in cosmetic outcome</li> </ul>
Risks, Harms, and Costs	<ul style="list-style-type: none"> <li>• Increase risk of nerve injury</li> <li>• Increased risk of hematoma</li> <li>• Longer operative time</li> <li>• Additional cost from multiple procedures</li> <li>• Increased risk of asymmetry</li> <li>• Recurrence of brow ptosis</li> <li>• Increased recovery time</li> <li>• Increased risk of pain</li> </ul>
Benefits/ Harms Assessment	<ul style="list-style-type: none"> <li>• Balance of Benefits and Harms</li> </ul>
Value Judgments	None
Intentional Vagueness	Did not define diagnosis of brow ptosis or specific surgical technique of brow lift
Role of Patient Preference	Moderate; risks and benefits of the procedures need to be explained
Exclusions	None
Differences of Opinion	None

**Rationale**

Commonly, patients seeking eyelid surgery who present with visual field impairment have concurrent brow ptosis and brow asymmetry. The eyebrow and forehead should be considered an aesthetic and functional anatomic extension of the upper eyelids. Therefore, eyebrow and forehead function should be evaluated in all patients who present with visual field complaints. A comprehensive physical exam should note the eyebrow position in relation to the supraorbital rim as well as recognize the presence of eyebrow asymmetry and any compensatory brow activity. In the setting of brow ptosis, patients should be given the option of concurrent brow surgery. The goal of concurrent brow surgery is to elevate the brows to an optimal position for better aesthetic result. Observational studies in the literature have shown that brow position (as measured laterally and centrally) may be inadvertently lowered post-operatively in patients who are diagnosed with brow ptosis undergoing upper blepharoplasty and/or ptosis surgery (Mokhtarzadeh, Massry, Bitrian, & Harrison, 2017; Lee, Lee, Lee, Park, & Baek, 2012). The

effect of postoperative brow ptosis is more prominent or occurs more often with ptosis surgery. One retrospective, consecutive cohort study found that patients with eyelid ptosis undergoing concurrent brow lift (technique not specified) had a decreased rate of revision relative to those without concurrent brow lift (Chou, et al., 2018). The lower revision rate may be due to the overall improved aesthetic appearance and decrease in brow weight on the eyelid.

In contrast to the aforementioned benefits of performing brow surgeries, certain factors limit the ability of patients to undergo concurrent brow procedures with eyelid surgeries. The associated expense of added procedures and longer operative time may be prohibitive to patients. Insurance authorization may be complicated if brow lift surgery is considered cosmetic and medically unnecessary. Furthermore, additional surgical risks, although low in frequency, are associated with eyebrow surgery. These risks include nerve injury, hematoma, wound healing issues, increased pain, and prolonged recovery time. With these in mind, the committee recommends that brow position and its effect on eyelid dynamics should be discussed with the patients during the preoperative assessment. The surgeon should then guide patients to select the appropriate brow lifting or brow stabilizing procedures depending on the patient's anatomy and desires as well as surgeon expertise.

Finally, a paucity of literature exists regarding the effect of different techniques of brow surgery (direct supra-brow excision, sub-brow excision, temporal, endoscopic, coronal, pretrichial, browpexy via blepharoplasty incision) on the outcomes of interest in concurrent eyelid and ptosis surgery. Therefore, there is no recommendation from the committee on specific techniques that should be employed during concurrent brow surgery. The work group encourages surgeons to use clinical aesthetic judgment to determine the type of brow surgery needed, and advocates for comparative research in this area to make stronger recommendations in the future.

The workgroup suggests that it is a valid option for surgeons to perform adjunctive brow surgery in patients presenting with dermatochalasis and co-existing brow and upper eyelid ptosis.



**Recommendation 7**

It is an option for surgeons to perform levator plication OR levator advancement for patients presenting with upper eyelid ptosis.

**Evidence Quality: Very Low Quality**

**Recommendation Strength: Option**

**Table 11. Perform Levator Plication**

Benefits	<ul style="list-style-type: none"> <li>• Simplicity</li> <li>• Shorter operative time</li> <li>• Low risk of hematoma</li> </ul>
Risks, Harms, and Costs	<ul style="list-style-type: none"> <li>• Risk of lid contour asymmetry</li> <li>• Risk of recurrent ptosis</li> <li>• Risk of mechanical failure</li> </ul>
Benefits/ Harms Assessment	<ul style="list-style-type: none"> <li>• Balance of Benefits and Harms</li> </ul>
Value Judgments	Surgeon proficiency has a strong role
Intentional Vagueness	None
Role of Patient Preference	None
Exclusions	None
Differences of Opinion	None

**Table 12. Perform Levator Advancement**

Benefits	<ul style="list-style-type: none"> <li>• Effective for ptosis correction</li> </ul>
Risks, Harms, and Costs	<ul style="list-style-type: none"> <li>• Increased risk of hematoma</li> <li>• Longer operative time</li> <li>• Technically demanding</li> </ul>
Benefits/ Harms Assessment	<ul style="list-style-type: none"> <li>• Balance of Benefits and Harms</li> </ul>
Value Judgments	Surgeon proficiency has a strong role
Intentional Vagueness	None
Role of Patient Preference	None
Exclusions	None
Differences of Opinion	None

**Rationale**

The work group was interested in better understanding and comparing outcomes associated with either levator plication or advancement. However, we were unable to find any studies directly comparing these techniques. We did find several case series discussing the efficacy of each technique, but all received an evidence grade of “very low quality” due to their study designs (Antus, Salam, Horvath, & Malhotra, 2018; Baik, et al., 2014; Byun, Hwang, Lee, Kim, & Kim, 2017). Technically, levator plication is

easier to perform with less complications than advancement. Theoretically, advancement would have a more mechanical advantage in terms of effectiveness of correcting blepharoptosis.

Due to the limited comparative evidence and relying on their cumulative clinical experience and the principles of plastic surgery, the work group consensus was that both levator advancement and levator plication are viable options for the treatment of blepharoptosis through an external (eyelid skin incision) approach. Additionally, surgeons should evaluate their proficiency in both techniques and understand a patient's goals and expectations for surgery prior to operating.

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**Recommendation 8**

The work group recommends that patients should have a post-operative follow-up assessment for complications, such as lagophthalmos and eyelid asymmetry. This should occur within 1 to 3 months following upper eyelid blepharoplasty and/or ptosis correction and again at 9 months to 1 year to evaluate cosmetic symmetry and functional outcomes.

**Evidence Quality: Moderate Quality**

**Recommendation Strength: Good Practice Recommendation**

**Table 13.**

Benefits	<ul style="list-style-type: none"> <li>• Optimize patient-doctor communication</li> <li>• Early identification of patients who may benefit from further management or counseling</li> <li>• Empower patients to express questions and satisfaction</li> <li>• Improve outcomes assessment and quality control</li> </ul>
Risks, Harms, and Costs	<ul style="list-style-type: none"> <li>• Additional cost of visit/travel/time to patient and physician</li> </ul>
Benefits/ Harms Assessment	<ul style="list-style-type: none"> <li>• Balance of Benefits and Harms</li> </ul>
Value Judgments	Surgeon proficiency has a strong role
Intentional Vagueness	Precise follow-up intervals are not defined
Role of Patient Preference	Small; scheduling, desire to be assessed more than the intervals outlined
Exclusions	None
Differences of Opinion	None

**Rationale**

While upper eyelid blepharoplasty and ptosis correction are conceptually simple procedures, attention to detail and technical finesse is necessary to achieve optimal outcomes. These surgeries can be pursued for functional and/or cosmetic reasons to improve peripheral vision and/or enhance the appearance of the eyelids. Follow-up appointments are excellent opportunities to better understand outcomes and to enhance patient-physician communication. Increased communication between the patient and physician can help patients to better understand the healing process and to form realistic expectations, as well as help the physician understand the patients' experiences, satisfaction, and other functional and cosmetic outcomes. Follow-up appointments are opportunities to identify areas for improved pre-operative patient counseling, technique enhancement, and to identify those patients who may benefit from further counseling or management, thus promoting quality control and improvement. Because of the potentially devastating consequences, early identification of exposure keratopathy due to

lagophthalmos and other mechanical eyelid abnormalities is key to counsel patients and achieve corneal protection. Critical appraisal of the results includes assessments of symmetry, eyelid contour and shape, and eyelid position (e.g. MRD-1), require longer follow up than the early postoperative period-- as does recognition of the need for revision procedures. Precise follow up intervals after upper blepharoplasty and/or eyelid ptosis repair have not been determined. The work group recommends good practice intervals of 1 to 3 months for early outcomes and 9 months to 1 year for longer term outcomes.

In addition to considering the benefits of post-operative follow-up visits, there is an associated cost for both patients and physicians to also take into account. These include the cost of follow-up office visits including those visits outside of the global period, visit lengths, and travel time to the appointments. Additionally, collection and assessment of outcome measures may cost the physician time and resources, particularly when additional measurements, photos, or patient-reported outcome measures questionnaires are used. In some cases, it may be impractical, and/or unnecessary for patients to return for follow-up, particularly when the patients are satisfied. For example, when patients have relocated to a different geographic area, or if patients initially traveled a far distance for surgical treatment. In these cases, advising patients to seek care with a local physician as necessary may be preferred.

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**TABLE 14. Summary of Recommendations**

<u>Recommendation</u>	<u>Level of Evidence</u>	<u>Assessment of Benefits/Harms</u>	<u>Strength of Recommendation</u>	<u>References</u>
1. The Work Group recommends that for patients presenting with low upper eyelid position, clinicians obtain a clinical history, which should include an assessment of impact on visual field or activities of daily living (ADL); <u>AND</u> , perform a physical exam to assess upper eyelid position (ptosis) relative to the pupil (such as MRD-1) with photographic documentation <u>AND</u> assessment of levator function.	Moderate	Preponderance of benefit over harm	Moderate	<p><b>Moderate quality:</b> (Bodnar, Neimkin, &amp; Holds, 2016)</p> <p><b>Low quality:</b> (Frueh &amp; Musch, 1996; Ho, Morawski, Sampath, &amp; Burns, 2011)</p> <p><b>Very Low quality:</b> (Erb, et al., 2004; Fowler, et al., 2015; Fuller, Briceno, Nelson, &amp; Bradley, 2017; Mak, et al., 2016; Nemet, Accuracy of Marginal Reflex Distance Measurements in Eyelid Surgery, 2015)</p>
2A. The Work Group suggests that surgeons not perform blepharoplasty alone (i.e. without ptosis correction) for patients presenting with diagnosed ptosis or low upper eyelid position.	Low	Preponderance of benefit over harm	Weak	<p><b>High quality:</b> (Tucker &amp; Cabral, 2000)</p> <p><b>Low quality:</b> (Black, Gladstone, &amp; Nesi, 2002; Chou, et al., 2018; Park &amp; Park, 2017; Rymer, Marinho, Cagliari, Marafon, &amp; Procianoy, 2017)</p> <p><b>Very low quality:</b> (Brown &amp; Putterman, 2000;</p>

				Fuller, Briceno, Nelson, & Bradley, 2017; Lee, Lee, Lee, Park, & Baek, 2012)
2B. The Work Group suggests that surgeons perform concurrent upper eyelid blepharoplasty and ptosis correction in patients presenting with ptosis and dermatochalasis (excess upper eyelid soft tissue hooding).	Low	Preponderance of benefit over harm	Weak	See 2A
2C. The Work Group suggests that surgeons perform upper eyelid blepharoplasty in patients presenting with dermatochalasis (excess upper eyelid soft tissue hooding) without underlying ptosis.	Low	Preponderance of benefit over harm	Weak	See 2A
3A. The Work Group recommends that surgeons should perform anterior ptosis correction for patients diagnosed with severe upper eyelid ptosis.	Moderate	Preponderance of benefit over harm	Moderate	<p><b>High quality:</b> (Saonanon &amp; Sithanon, 2018; Tucker &amp; Cabral, 2000)</p> <p><b>Low quality:</b> (Chou, et al., 2018; Danesh, Ugradar, Goldberg, Joshi, &amp; Rootman, 2018)</p> <p><b>Very low quality:</b> (Ben Simon, Lee, Schwarcz, McCann, &amp; Goldberg, 2005; Collin &amp; McNab, 1989; Nemet, The Effect of Hering's Law on Different Ptosis Repair Methods,</p>

				2015; Sohrab & Lissner, 2016; Spahiu, Spahiu, & Dida, 2008; Thomas, Chan, Sundar, & Amrith, 2017)
3B. It is an option for surgeons to perform either anterior or posterior ptosis correction for patients diagnosed with mild or moderate upper eyelid ptosis.	Moderate	The benefits and harms are balanced	Option	See 3A
5. The Work Group suggests that surgeons may use local anesthesia for patients presenting for upper eyelid ptosis correction and/or blepharoplasty.	Low	Preponderance of benefit over harm	Weak	<b>Low quality:</b> (Chou, et al., 2018) <b>Very low quality:</b> (Eshraghi & Ghadimi, 2018)
6. It is an option for surgeons to perform adjunctive brow surgery in patients presenting with dermatochalasis and co-existing brow and upper eyelid ptosis.	Low	The benefits and harms are balanced	Option	<b>Low quality:</b> (Chou, et al., 2018; Mokhtarzadeh, Massry, Bitrian, & Harrison, 2017)
7. It is an option for surgeons to perform levator plication OR levator advancement for patients presenting with upper eyelid ptosis.	Very Low	The benefits and harms are balanced	Option	<b>Very low quality:</b> (Antus, Salam, Horvath, & Malhotra, 2018; Baik, et al., 2014; Byun, Hwang, Lee, Kim, & Kim, 2017; Park & Park, 2017)
8. The Work Group recommends that patients should have an assessment for complications including asymmetry and lagophthalmos within 1-3 months following the procedure and again ideally at 9 months to 1 year for patients who have had upper	Moderate	The benefits and harms are balanced	Good Practice	N/A

eyelid ptosis correction and/or blepharoplasty.				
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## **CONCLUSIONS AND FUTURE DIRECTIONS**

The review of the literature revealed varied complication rates and diverse treatment modalities for the correction of the upper visual field deficit. These disparities may arise due to the diversity of the cause of visual field obstruction (dermatochalasis versus ptosis versus combination of both), the presence of asymmetry, and compensatory mechanisms involved. The review of literature has revealed a wide range of complication rates especially in blepharoptosis, as blepharoptosis correction is a more technically demanding procedure and there is a variation in practice based on diagnosis and a surgeon's preference on how to correct these defects. In the case of unilateral ptosis or asymmetric upper visual field obstruction, the correction of one eyelid will also affect the contralateral side due to the Hering's Law. In addition, correcting the upper visual field obstruction may reduce or eliminate the compensatory mechanism of the brow hyperactivity and thus cause postoperative brow ptosis. Furthermore, among the various degrees of mild, moderate, and severe ptosis, the more severe the ptosis, the more difficult it is to correct the visual field obstruction necessitating a more technically advanced correction method.

Reducing the wide-ranging revision rates can improve the overall health care cost and quality of life for patients. Unfortunately, many of the publications on this topic were of low- or very low- quality due to the lack of high-quality randomized control trials in the eyelid surgery literature. Even so, more rigorously designed prospective observational studies are needed to measure outcomes of interest with less sources of potential error or bias which will provide the evidence base for stronger recommendations in future iterations of this guideline.

## **DISCLOSURES**

As of this draft, there were no relevant disclosures. Disclosures will be updated prior to publication.

## References

- Aheuro, A. E., Winn, B. J., & Sires, B. S. (2012). Standardized suture placement for mini-invasive ptosis surgery. *Arch Facial Plast Surg, 14*(6), 408-412.
- Alniemi, S. T., Pang, N. K., Woog, J. J., & Bradley, E. A. (2013). Comparison of automated and manual perimetry in patients with blepharoptosis. *Ophthal Plast Reconstr Surg, 29*(5), 361-363.
- American Medical Association. (2018). RUC Database 2019, Version 2.
- American Society of Anesthesiologists. (2018, March). Practice Guidelines for Moderate Procedural Sedation and Analgesia 2018. *Anesthesiology, 128*, 437-479.
- American Society of Plastic Surgeons. (2018). *Plastic Surgery Statistics Report*. Arlington Heights: ASPS National Clearinghouse of Plastic Surgery Procedural Statistics.
- Antus, Z., Salam, A., Horvath, E., & Malhotra, R. (2018). Outcomes for severe aponeurotic ptosis using posterior approach white-line advancement ptosis surgery. *Eye, 32*(1), 81-86.
- Baik, B. S., Ha, W., Lee, J. W., Ji, S. Y., Yang, W. S., Park, D., & Kim, K. K. (2014). Adjunctive Techniques to Traditional Advancement Procedures for Treating Severe Blepharoptosis. *Plast Reconstr Surg, 133*(4), 887-896.
- Battu, V. K., Meyer, D. R., & Wobig, J. L. (1996). Improvement in subjective visual function and quality of life outcome measures after blepharoptosis surgery. *Am J Ophthalmol, 121*(6), 677-686.
- Ben Simon, G. J., Lee, S., Schwarcz, R. M., McCann, J. D., & Goldberg, R. A. (2005). External levator advancement vs Muller's muscle-conjunctival resection for correction of upper eyelid involuntional ptosis. *Am J Ophthalmol, 140*(3), 426-432.
- Berke, R. N. (1952). A simplified Blaskovics operation for blepharoptosis. Results in ninety-one operations. *Arch Ophthalmol, 48*(4), 460-495.
- Black, E. H., Gladstone, G. J., & Nesi, F. A. (2002). Eyelid sensation after supratarsal lid crease incision. *Ophthalmic Plast Reconstr Surg, 18*(1), 45-49.
- Bodian, M. (1982). Lid droop following contralateral ptosis repair. *Arch Ophthalmol, 100*(7), 1122-1124.
- Bodnar, Z. M., Neimkin, M., & Holds, J. B. (2016). Automated Ptosis Measurements From Facial Photographs. *JAMA Ophthalmol, 134*(2), 146-150.
- Brown, M. S., & Putterman, A. M. (2000). The effect of upper blepharoplasty on eyelid position when performed concomitantly with Muller muscle-conjunctival resection. *Ophthalmic Plast Reconstr Surg, 16*(2), 94-100.
- Byun, J. S., Hwang, K., Lee, S. Y., Kim, H. T., & Kim, K. (2017). Levator Aponeurosis and Muller Muscle Plication Reinforced With Levator Sheath Advancement for Blepharoptosis Correction. *J Craniofac Surg, 28*(7), 1849-1851.
- Chang, S., Lehrman, C., Itani, K., & Rohrich, R. J. (2012). A systematic review of comparison of upper eyelid involuntional ptosis repair techniques: efficacy and complication rates. *Plast Reconstr Surg, 129*(1), 149-157.

- Chou, E., Liu, J., Seaworth, C., Furst, M., Amato, M. M., Blaydon, S., . . . Shore, J. W. (2018). Comparison of Revision Rates of Anterior- and Posterior-Approach Ptosis Surgery: A Retrospective Review of 1519 Cases. *Ophthalmic Plast Reconstr Surg*, 34(3), 246-253.
- Collin, R., & McNab, A. (1989). Is there still a place for conjunctival-approach ptosis surgery? *Int Ophthalmol Clin*, 29(4), 219-225.
- Danesh, J., Ugradar, S., Goldberg, R., Joshi, N., & Rootman, D. B. (2018). Significance of Early Postoperative Eyelid Position on Late Postoperative Result in Mueller's Muscle Conjunctival Resection and External Levator Advancement Surgery. *Ophthalmic Plast Reconstr Surg*, 34(5), 432-435.
- Drolet, B. C., & Sullivan, P. K. (2014). Evidence-based medicine: Blepharoplasty. *Plast Reconstr Surg*, 133(5), 1195-1205.
- Erb, M. H., Kersten, R. C., Yip, C. C., Hudak, D., Kulwin, D. R., & McCulley, T. J. (2004). Effect of unilateral blepharoptosis repair on contralateral eyelid position. *Ophthalmic Plast Reconstr Surg*, 20(6), 418-422.
- Eshraghi, B., & Ghadimi, H. (2018). Small-incision levator resection for correction of congenital ptosis: a prospective study. *Graefes Arch Clin Exp Ophthalmol*, 256(9), 1747-1750.
- Federici, T. J., Meyer, D. R., & Lininger, L. L. (1999). Correlation of the vision-related functional impairment associated with blepharoptosis and the impact of blepharoptosis surgery. *Ophthalmology*, 106(9), 1705-1712.
- Fowler, B. T., Pegram, T. A., Cutler-Peck, C., Kosko, M., Tran, Q. T., Fleming, J. C., & Oester, A. E. (2015). Contrast Sensitivity Testing in Functional Ptosis and Dermatochalasis Surgery. *Ophthal Plast Reconstr Surg*, 31(4), 272-274.
- Friedland, J. A., Lalonde, D. H., & Rohrich, R. J. (2010). An evidence-based approach to blepharoplasty. *Plast Reconstr Surg*, 126(6), 2222-2229.
- Frueh, B. R., & Musch, D. C. (1996). Evaluation of levator muscle integrity in ptosis with levator force measurement. *Ophthalmology*, 103(2), 244-250.
- Fuller, M. L., Briceno, C. A., Nelson, C. C., & Bradley, E. A. (2017). Tangent screen perimetry in the evaluation of visual field defects associated with ptosis and dermatochalasis. *PLoS One*, 12(3), e0174607.
- Ho, S. F., Morawski, A., Sampath, R., & Burns, J. (2011). Modified visual field test for ptosis surgery (Leicester Peripheral Field Test). *Eye (Lond)*, 25(3), 365-369.
- Jacobs, L. C., Liu, F., Bleyen, I., Gunn, D. A., Hofman, A., Klaver, C. C., . . . Nijsten, T. (2014). Intrinsic and extrinsic risk factors for sagging eyelids. *JAMA Dermatol*, 150(8), 836-843.
- Jacobsen, A. G., Brost, N., Vorum, H., & Hargitai, J. (2017). Functional benefits and patient satisfaction with upper blepharoplasty - evaluated by objective and subjective outcome measures. *Acta Ophthalmol*, 95(8), 820-825.

- Johnson, C. C. (1954). Blepharoptosis: A general consideration of surgical methods with the results in 162 operations. *Am J Ophthalmol*, 38(2), 129-162.
- Kim, Y. K., In, J. H., & Jang, S. Y. (2016). Changes in Corneal Curvature After Upper Eyelid Surgery Measured by Corneal Topography. *J Craniofac Surg*, 27(3), e235-e238.
- Lee, J. M., Lee, T. E., Lee, H., Park, M., & Baek, S. (2012). Change in brow position after upper blepharoplasty or levator advancement. *J Craniofac Surg*, 23(2), 434-436.
- Mak, F. H., Harker, A., Kwon, K. A., Edirisinghe, M., Rose, G. E., Murta, F., & Ezra, D. G. (2016). Analysis of blink dynamics in patients with blepharoptosis. *J R Soc Interface*, 13(116).
- Mawatari, Y., Fukushima, M., & Kawaji, T. (2017). Changes in Sunken Eyes Combined with Blepharoptosis after Levator Resection. *Plast Reconstr Surg Glob Open*, 5(12), e1616.
- McCulley, T. J., Kersten, R. C., Kulwin, D. R., & Feuer, W. J. (2003). Outcome and influencing factors of external levator palpebrae superioris aponeurosis advancement for blepharoptosis. *Ophthalmic Plast Reconstr Surg*, 19(5), 388-393.
- Mokhtarzadeh, A., Massry, G. G., Bitrian, E., & Harrison, A. R. (2017). Quantitative efficacy of external and internal browpexy performed in conjunction with blepharoplasty. *Orbit*, 36(2), 102-109.
- Nemet, A. Y. (2015). Accuracy of Marginal Reflex Distance Measurements in Eyelid Surgery. *J Craniofac Surg*, 26(7), e569-e571.
- Nemet, A. Y. (2015). The Effect of Hering's Law on Different Ptosis Repair Methods. *Aesthet Surg J*, 35(7), 774-781.
- Pan, E., Yu, J., Zhang, S., Nie, Y., & Li, Q. (2018). Retrospective Analysis of the Effect of Hering's Law on Outcomes of Surgical Correction of Ptosis. *Ann Plast Surg*, 80(3), 242-244.
- Park, K. S., & Park, D. D. (2017). Objective Outcome Measurement After Upper Blepharoplasty: An Analysis of Different Operative Techniques. *Aesthetic Plast Surg*, 41(1), 64-72.
- Pascali, M., Bocchini, I., Avantiaggiato, A., Carinci, F., Cervelli, V., Orlandi, F., & Quarato, D. (2016). Direct brow lifting: Specific indications for a simplified approach to eyebrow ptosis. *Indian J Plast Surg*, 49(1), 66-71.
- Pereira, L. S., Hwang, T. N., Kersten, R. C., Ray, K., & McCulley, T. J. (2008). Levator superioris muscle function in involutional blepharoptosis. *Am J Ophthalmol*, 1095-1098.
- Rymer, B. L., Marinho, D. R., Cagliari, C., Marafon, S. B., & Procianoy, F. (2017). Effects of Muller's muscle-conjunctival resection for ptosis on ocular surface scores and dry eye symptoms. *Orbit*, 36(1), 1-5.
- Saonanon, P., & Sithanon, S. (2018). External Levator Advancement versus Muller Muscle-Conjunctival Resection for Aponeurotic Blepharoptosis: A Randomized Clinical Trial. *Plast Reconstr Surg*, 141(2), 213e-219e.

- Shiffman, R. N., Michel, G., Rosenfeld, R. M., & Davidson, C. (2012). Building better guidelines with BRIDGE-Wiz: development and evaluation of a software assistant to promote clarity, transparency, and implementability. *J Am Med Inform Assoc*, *19*(1), 94-101.
- Sohrab, M. A., & Lissner, G. S. (2016). Comparison of Fasanella-Servat and Small-Incision Techniques for Involutional Ptosis Repair. *Ophthalmic Plast Reconstr Surg*, *32*(2), 98-101.
- Spahiu, K., Spahiu, L., & Dida, E. (2008). Choice of surgical procedure for ptosis correction. *Med Arh*, *62*(5-6), 283-284.
- Thomas, G. N., Chan, J., Sundar, G., & Amrith, S. (2017). Outcomes of levator advancement and Muller muscle-conjunctiva resection for the repair of upper eyelid ptosis. *Orbit*, *36*(1), 39-42.
- Trussler, A. P., & Rohrich, R. J. (2008). MOC-PSSM CME article: Blepharoplasty. *Plast Reconstr Surg*, *121*(1 Suppl), 1-10.
- Tucker, S. M., & Cabral, H. (2000). Incidence of lagophthalmos after aponeurotic ptosis repair. *Orbit*, *19*(2), 61-66.
- Tucker, S. M., & Verhulst, S. J. (1999). Stabilization of eyelid height after aponeurotic ptosis repair. *Ophthalmology*, *106*(3), 517-522.
- Watanabe, A., Selva, D., Kakizaki, H., Oka, Y., Yokoi, N., Wakimasu, K., . . . Kinoshita, S. (2014). Long-term tear volume changes after blepharoptosis surgery and blepharoplasty. *Invest Ophthalmol Vis Sci*, *56*(1), 54-58.
- Young, S. M., Lim, L. H., Seah, L. L., Choo, C. T., Chee, E. W., Shen, S. Y., . . . Looi, A. L. (2013). Prospective audit of ptosis surgery at the Singapore National Eye Centre: two-year results. *Ophthalmic Plast Reconstr Surg*, *29*(6), 446-453.
- Zigotti, G. L., Delia, G., Grenga, P., Pichi, F., Rechichi, M., Jaroudi, M. O., . . . Meduri, A. (2016). Elevator Muscle Anterior Resection: A New Technique for Blepharoptosis. *J Craniofac Surg*, *27*(1), 201-203.
- Zoumalan, C. I., & Lisman, R. D. (2010). Evaluation and management of unilateral ptosis and avoiding contralateral ptosis. *Aesthet Surg J*, *30*(3), 320-328.