

## Lower Eyelid Blepharoplasty: Analysis of Indications and the Treatment of 100 Patients

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Traditionally, lower lid blepharoplasty has been confined to a choice of skin or skin-muscle flap transcutaneous blepharoplasty. In the past decade, in particular, various new techniques and technologies have emerged, altering our ability to treat the lower eyelids. These techniques include transconjunctival blepharoplasty, a variety of canthopexy procedures, fat-conserving or fat-replacing methods, wedge excision, and laser resurfacing techniques, and they allow a more individualized approach based on variations in anatomical features and patient goals. A retrospective review of data for 100 consecutive patients (ranging in age from 30 to 80 years) who underwent lower eyelid procedures during a 12-month period is presented. Procedures were categorized as follows: lower lid blepharoplasty, 35 cases; lower lid transconjunctival blepharoplasty, 27 cases; lower lid transconjunctival blepharoplasty with laser resurfacing, 17 cases; lower lid laser resurfacing, 16 cases; tarsorrhaphy with lower lid operation, three cases; tarsorrhaphy with laser resurfacing, two cases. Two complications of retained fat pads (one medial and one lateral) were encountered and were addressed with a secondary operation using a transconjunctival blepharoplasty approach. The results indicate that laser treatment has become the predominant form of lower eyelid resurfacing and that transconjunctival blepharoplasty is now the most common surgical procedure for the lower eyelid. All of our tarsorrhaphy procedures were performed for patients who had previously undergone surgical treatment of the lower eyelids. An algorithm based on physical findings and these techniques has been developed, for appropriate tailoring of the procedure to each patient's specific concerns. With the availability of a variety of techniques, an individualized approach based on variations in anatomical features is feasible. (*Plast. Reconstr. Surg.* 111: 1299, 2003.)

Blepharoplasty is an often-performed aesthetic procedure. Evidence of aging often first appears in the orbital area, characterized by alterations in the quality or quantity of skin, the herniation of lower lid fat, or lengthening

of the lower lid margin, among other things. Although the most common cosmetic problems are fat herniation and wrinkling of the lower eyelid skin, orbicularis muscle hypertrophy and other aesthetic conditions, such as scleral show or prominent globes, are also encountered and may be discussed with patients in preoperative evaluations. Ideally, surgical procedures should be customized for each patient, to allow an individualized approach based on variations in anatomical features and patient concerns.

Lower lid operations have traditionally involved a choice of skin or skin-muscle flap transcutaneous blepharoplasty, with little difference in results between the two procedures.<sup>1</sup> In the past decade, increased interest in transconjunctival blepharoplasty, a variety of lateral canthal techniques, fat-conserving or fat-replacing methods, wedge excision, and newer laser resurfacing techniques have improved our ability to treat the lower eyelid. The first report describing transconjunctival blepharoplasty for removal of lower eyelid fat appeared in the French literature in 1924,<sup>2</sup> but few additional reports on this procedure were published until 1975.<sup>3</sup> Another author described using the transconjunctival technique as an approach to the orbital floor in craniofacial reconstruction.<sup>4</sup> Numerous authors have popularized the transconjunctival approach for fat removal from the lower eyelids.<sup>5,6</sup> The transconjunctival approach has the advantage of addressing lower eyelid fullness attributable to prominent orbital fat with a much lower risk of lid retraction and without visible incisions,

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and it can be safely combined with resurfacing.<sup>7</sup> Neither the transcutaneous method nor the transconjunctival method adequately addresses the presence of excess damaged lower eyelid skin, and therein lies the need for adjunctive procedures, such as laser resurfacing, chemical skin peels, or canthopexy procedures.

Although transconjunctival and resurfacing procedures have vast appeal, there are still indications for the transcutaneous approach, such as orbicularis muscle hypertrophy or treatment of older patients with excessive skin redundancy and sagging lower lids, who may also require adjunctive procedures such as canthopexy or tarsorrhaphy. By identifying the anatomical abnormalities and choosing the proper techniques, surgeons can achieve satisfactory lower eyelid rejuvenation while preserving function and minimizing complications. Recognition of the specific features of patients' aesthetic concerns during preoperative evaluations serves to focus on the patients' understanding and expectations of realistic surgical results. We therefore report our experience with different methods of lower eyelid surgical procedures, retrospectively reviewing data for a series of 100 consecutive patients who underwent different types of lower lid rejuvenation procedures, and we propose an algorithm for the treatment of lower eyelid blepharochalasis.

#### PATIENTS AND METHODS

One hundred consecutive cases of lower eyelid rejuvenation procedures performed by the senior author (A.M.) within a 12-month period were reviewed. The ages of the patients ranged from 30 to 80 years. There were seven male patients and 93 female patients. Many of the patients concomitantly underwent other procedures, such as face lifts, forehead lifts, upper lid blepharoplasty, or body contour operations. Follow-up periods ranged from 12 months to more than 24 months.

Preoperative evaluations included a thorough ophthalmic history, including data on prior operations, ocular trauma, allergies, dermatological disorders, dry eyes, or other relevant conditions (such as Graves' disease). All patients underwent preoperative visual acuity testing, and some underwent Schirmer's test or tear production tests, as indicated. Patients were questioned regarding any bleeding disorders or the recent use of procoagulant medications, and standard perioperative medications and protocols were suggested.

Professional preoperative photographs were obtained, including upward gaze, eyes open, eyes closed, squinting, and up-close lateral views.

Evaluations included questioning the patients regarding their aesthetic concerns and correlating those concerns with anatomical findings. The skin condition, lower eyelid position, muscle hypertrophy, and fat herniation were specifically evaluated and discussed. The relationship of the lower eyelid margin to the inferior corneal limbus, scleral show, orbital proptosis, inadequate infraorbital rims, malar hypoplasia and edema, orbicularis muscle hypertrophy, and lateral canthal rhytids were also noted. Rees and LaTrenta<sup>8</sup> noted that certain morphological features, such as inadequate infraorbital rims, maxillary hypoplasia, and orbital proptosis, might make patients more prone to developing lower eyelid retraction and subsequent dry eye. The lower eyelid skin was examined with respect to quality and quantity. More specifically, the lower lid skin was examined for redundancy, wrinkling, and laxity (bowing). The goal of the preoperative consultations was to clarify the patients' concerns, identify patients at increased risk of developing postoperative complications, and counsel the patients regarding what each procedure could achieve. Informed consent was obtained from all patients.

The patients underwent lower lid blepharoplasty under sedation or general anesthesia supplemented with local anesthesia (1% lidocaine with 1/100,000 epinephrine), depending on the extent of the operation (i.e., concomitant procedures), age, and general medical condition. Metal laser-specific eye shields were used for cases of laser resurfacing. Transcutaneous blepharoplasty was performed in the standard manner, with an infraciliary incision and subsequent dissection of a skin-muscle flap.<sup>8</sup> Transconjunctival blepharoplasty was performed by widely incising the conjunctiva 1 to 2 mm below the caudad margin of the inferior tarsus and dissecting through the capsulopalpebral fascia, to enter the orbital fat compartments retroseptally.<sup>6</sup>

Patients who underwent laser resurfacing (with erbium or carbon dioxide lasers) in conjunction with lower lid blepharoplasty were treated according to accepted protocols. Tarsorrhaphy procedures included temporary lid support produced by suturing the upper and lower lid gray lines closed,<sup>9</sup> tarsorrhaphy

TABLE I  
Lower Lid Rejuvenation Procedures

Procedure	No. of Cases
Transcutaneous blepharoplasty	35
Transconjunctival blepharoplasty	27
Transconjunctival blepharoplasty with laser resurfacing	17
Lower lid laser resurfacing	16
Tarsorrhaphy with transcutaneous blepharoplasty	3
Tarsorrhaphy with laser resurfacing	2
Tarsorrhaphy and lower lid operation with laser resurfacing	0

through the upper eyelids, lateral canthopexy, or canthoplasty.

A specific postoperative protocol was used according to the procedure performed. Pitman<sup>10</sup> discusses the definitions of canthoplasty and canthopexy. These words are often used interchangeably, but each has a more specific meaning. Canthoplasty is an operation to shape or form the corner of the eye, whereas canthopexy is an operation to fixate the corner

of the eye. Canthoplasty usually includes canthopexy.

## RESULTS

One hundred consecutive patients who underwent lower lid rejuvenation procedures (Table I) within a 12-month period were included. Thirty-five patients underwent lower lid transcutaneous skin-muscle flap blepharoplasty as their only procedure (Fig. 1). Forty-four patients underwent transconjunctival blepharoplasty, of whom 27 underwent that procedure alone (Fig. 2) and 17 underwent adjunctive laser resurfacing of the lower lids (Fig. 3). A total of 35 patients underwent laser resurfacing of the lower lids. Of those patients, 16 patients underwent laser resurfacing alone (Fig. 4), 17 underwent adjunctive transconjunctival blepharoplasty, and two underwent adjunctive tarsorrhaphy. Three patients underwent combined tarsorrhaphy and transcutaneous lower lid blepharoplasty. The five patients



FIG. 1. (Above) Preoperative view of a 40-year-old woman who requested eyelid rejuvenation. (Below) Postoperative view of the patient 1 year after transcutaneous skin muscle lower lid blepharoplasty. The patient underwent concomitant upper lid blepharoplasty. It should be noted that this patient is proptotic.



FIG. 2. (Above) Preoperative view of a 34-year-old woman with concerns regarding lower eyelid "bags." (Below) Postoperative view 6 months after lower lid transconjunctival blepharoplasty.

who underwent tarsorrhaphy procedures had previously undergone a lower eyelid operation. None of the patients in this series had lower lid fat repositioning or wedge resection of skin without undermining, although since this report was written these techniques have been incorporated into our practice as indicated.

Two patients who underwent transconjunctival blepharoplasty complained of retained fat pads (one medial and one lateral) and underwent a revision operation through the transconjunctival approach. There were occasional complaints of corneal irritation within the first 24 hours. No other complications were reported. All patients were satisfied with the aesthetic outcomes.

#### DISCUSSION

Certain trends in this series that occurred in the past decade as a result of advances in techniques and new technology, as well as enhanced appreciation of anatomical features, are worth noting. Laser treatment (in particu-

lar, erbium laser treatment) has become the predominant form of lower eyelid resurfacing ( $n = 35$ ). Also, transconjunctival blepharoplasty appears to be the most common surgical procedure for the lower eyelids ( $n = 44$ ). In our series, all of the tarsorrhaphy procedures ( $n = 5$ ) were performed among patients who had previously undergone surgical treatment of the lower eyelids.

We recognize that wedge resection of skin without undermining as well as fat repositioning methods and fat injection techniques are appropriate techniques, although they were not incorporated into our practice at the time of this series. These procedures are now used as indicated. For example, wedge resection has been used with transconjunctival blepharoplasty, with or without resurfacing, for those patients who require skin excision but are not appropriate candidates for the skin-muscle flap transcutaneous approach or for whom malposition is a concern.

The increased popularity of transconjuncti-



FIG. 3. (Above) Preoperative view of a 49-year-old woman. (Below) Postoperative view of the patient 1 year after lower lid transconjunctival blepharoplasty with periocular erbium laser resurfacing. The patient underwent concomitant upper lid blepharoplasty.

val lower lid blepharoplasty and laser resurfacing is well recognized.<sup>11</sup> However, there has been some controversy regarding the relative merits of the transconjunctival approach versus the more traditional subciliary transcutaneous approach for lower lid blepharoplasty.<sup>12</sup> Our goal is to determine the most appropriate rejuvenation procedure for the lower eyelids, on the basis of anatomical findings and patient goals. An algorithm based on physical findings and these seven techniques for lower lid rejuvenation has been developed (Table II), for appropriate tailoring of procedures to the specific anatomical concerns of the patients.

On the basis of this algorithm, patients whose only anatomical problem is excessive fat may undergo lower lid transconjunctival or transcutaneous blepharoplasty. Patients with loose or damaged skin in addition to excess fat require adjunctive resurfacing and possibly even tarsorrhaphy, to tighten and improve the

quality of the lower lid skin. Some have suggested that fine eyelid rhytids are best addressed with laser resurfacing or chemical peeling, rather than skin excision.<sup>13</sup> This can be accomplished as a one-stage procedure involving the transconjunctival approach for the fat pads and adjunctive laser resurfacing or chemical peeling for the skin. Excessively lax or malpositioned lids may also require a lateral canthal tightening procedure or tarsorrhaphy. Although none of the patients in this series underwent skin excision with the wedge technique without undermining, this is an appropriate method for removing excessive lower eyelid skin, with minimal potential for interfering with lower eyelid positioning.<sup>14</sup> Wedge excision of skin is performed by coapting a 1-mm to 3-mm wedge of excess skin with a straight clamp and then excising it at the ciliary margin with straight scissors. No undermining of the



FIG. 4. (Above) Preoperative view of a 41-year-old woman. (Below) Postoperative view of the patient 1 year after lower lid erbium laser resurfacing.

skin is performed, and closure is achieved with running 6-0 silk sutures.

Patients with orbicularis muscle hypertrophy (regardless of the presence of any other anatomical deformity) for whom a small resection of preseptal orbicularis muscle is considered advisable should undergo lower lid blepharoplasty through the transcutaneous approach, for observation and cautious resection of the muscle. Patients with loose or damaged lower lid skin as their only deformity may undergo laser resurfacing with or without tarsorrhaphy or a wedge resection, depending on the severity of the loose skin and the position of the lid margin (Table II).

The goal of the lower eyelid rejuvenation operation is to achieve the desired cosmetic outcome without compromising structure and function. This involves addressing excess fat, damaged skin, and hypertrophied muscle, as indicated. The retroseptal transconjunctival blepharoplasty for the lower eyelids avoids damage to the orbital septum, which is violated during transcutaneous lower lid blepharoplasty. This disruption of the orbital septum or denervation may

result in contracture and scarring, with resultant retraction, round eye, and scleral show. This may explain the retraction and ectropion that occur even with conservative skin excisions with transcutaneous blepharoplasty.<sup>15</sup> Conservative skin, muscle, and fat excisions have reduced but not eliminated these lower lid complications.<sup>16</sup>

Traditionally, the transcutaneous approach to the lower eyelid has been the standard with which all other aesthetic procedures for this structure are compared. The recent popularity of the transconjunctival technique for lower lid rejuvenation has been a response to the incidence of lower lid malpositioning (retraction, ectropion, and scleral show) associated with the transcutaneous approach<sup>17</sup> and the desire for a "scarless" operation. The efficacy of this procedure, the comparatively low rate of eyelid malposition, and patient acceptance of the transconjunctival approach have all served to increase its popularity. However, the limitations of transconjunctival blepharoplasty in addressing redundant or wrinkled skin and hypertrophic orbicularis muscle necessitate adjunctive or alternative procedures to address

TABLE II  
Algorithm for Options in Lower Eyelid Rejuvenation\*

Physical Finding	Transcutaneous Blepharoplasty		Skin Wedge Excision	Wedge Excision with Transconjunctival Blepharoplasty with or without Laser Resurfacing		Transconjunctival Blepharoplasty	Transconjunctival Blepharoplasty with Laser Resurfacing	Laser Resurfacing	Tarsorrhaphy	Tarsorrhaphy with Lower Lid Blepharoplasty	Tarsorrhaphy with Laser Resurfacing	Tarsorrhaphy with Laser Resurfacing and Lower Lid Blepharoplasty
	+	+		+	+							
Large fat pads	+											
Large fat pads with loose/damaged skin	+		+							+		+
Large fat pads with loose/damaged skin and muscle hypertrophy	+											
Loose/damaged lower lid skin or malpositioned skin	+							+				
Muscle hypertrophy	+										+	

\*Does not include fat injections or fat repositioning.

these problems. Wedge skin excisions without undermining, laser resurfacing, and chemical peeling have all evolved as adjunctive procedures performed at the time of or subsequent to transconjunctival blepharoplasty.<sup>18</sup> However, orbicularis muscle hypertrophy in the lower lids is still considered an absolute indication for the transcutaneous approach. Skin resection is also indicated when the lid skin is redundant. According to Zarem and Resnick,<sup>19</sup> if one is undecided regarding the need for skin resection, then it is most prudent to perform the transconjunctival blepharoplasty without skin resection, with the understanding that it might be needed at a later time. Those authors noted that, even among elderly patients with excess skin, fewer patients than expected required skin excision at a later time.

Although transconjunctival blepharoplasty reduces the risk of lower lid malpositioning, there still are some potential disadvantages of transconjunctival blepharoplasty. Inadequate fat removal is the most often reported potential complication of transconjunctival blepharoplasty, but this can be reduced with graded thorough removal or repositioning of lower lid fat.<sup>20</sup> Other authors confirmed that exposure of fat pads was more difficult with transconjunctival blepharoplasty than with the transcutaneous approach.<sup>13</sup> However, under-resection of fat is a relatively minor disadvantage and can be easier to correct than lower lid malpositioning.

CONCLUSIONS

Our study reveals that an array of different procedures for lower eyelid rejuvenation are available based on variations in anatomy and patients' desires. When different procedures could be equally successful, the patient's preference for a specific technique frequently prevailed. We present an algorithm as a basis for the initial evaluation and treatment of the frequent anomalies that characterize the aging lower eyelid.

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