Simplified Muscle-Suspension Lower Blepharoplasty by Orbicularis Hitch

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Abstract

Background: The suspension of orbicularis oculi during lower blepharoplasty presents a logical surgical addition for further support of the lid, as well as further improvement to its contour profile. It has traditionally been performed as an extension of the skin-muscle flap procedure, but more recently, and aggressively, as a muscle strap-flap separated from the orbicularis sheet by myotomy. Many benefits of suspension, however, can be achieved without incision into muscle (beyond a single stab-wound “button-hole”) and without delamination of the lid, as a safe, simple, single-suture suspension of preseptal muscle to lateral orbital rim.

Objectives: The purpose of this report was to evaluate the results of a simplified approach to muscle suspension during lower blepharoplasty.

Methods: One hundred lower blepharoplasties by orbicularis hitch, performed as two consecutive series of 50, one by a plastic surgeon, the other by an oculoplastic surgeon, were reviewed retrospectively.

Results: Skin was resected from all lids, with a mean skin excision of 8 mm and 5 mm, respectively. Average follow-up was 17 and 16 months. Lateral canthal support was added to 2.5% of lids. There was one lid malposition (0.5%), leading to surgical revision, and no other complication or reoperation.

Conclusions: Lower blepharoplasty by orbicularis hitch provides the benefits of muscle suspension by way of a simple, single-suture elevation of descended muscle, without the need for significant myotomy or lateral canthal manipulation. Despite its limited surgical invasiveness, it has proven both safe and effective in reversing muscle descent with skin redundancy, while maintaining lid support and lateral canthal integrity.

Level of Evidence: 4

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The plastic surgeon (J.W.L.) first performed lower blepharoplasty as a skin flap (trimmed during open-mouth, upward-gaze posture1), before embracing the comfort of a transconjunctival approach alone.2 Later, he remedied volume deficiencies through midface lift3 augmented by dermal-fat graft,4 but now by microstructural fat graft5 alone. He returned to subciliary blepharoplasty in the 1990s, this time as a pre-measured skin excision (up to 20 mm) accompanied by single-suture suspension of the exposed muscle coat—a procedure he referred to, and began teaching, as “orbicularis hitch” (o.h.). An occasional buckle of the lateral-most lid away from the globe remained self-correcting over time (none came to surgery), but prompted routine horizontal lid tightening by drawing the terminal tarsus toward Whitnall’s tubercle—a simplified version of a common lid-stabilizing maneuver that he referred to as “tarsopexy.” Further consideration, however, presented a novel solution that has essentially eliminated such lateral canthal manipulation during o.h.: nasal shift of the tarsus-bearing margin of a laxer lid during closure. As the benefits of volume restoration alone became more apparent, he progressively limited operative blepharoplasty to lids with more than 5 mm of orbicularis descent and...
attendant skin excess (seen in less than one in five patients within his practice).

The plastic surgeon and oculoplastic surgeon (M.E.H) met as faculty members of a cadaver workshop on facial rejuvenation. The latter admired the simplicity and effectiveness of o.h., adopting it as his basic blepharoplasty. His previous technique treated volume by transconjunctival fat removal or repositioning, but more recently by fat grafting; skin excision or transposition of herniated orbital fat and the addition of fat grafts, injectable fillers, or suborbital solid implants (the non-"hitch" or volumetric component). They alternatively treated volume within and below the lid, brought about through the excursion or transposition of herniated orbital fat and the addition of fat grafts, injectable fillers, or suborbital solid implants (the non-"hitch" or volumetric component). They exactly concur with respect to the former (except for the 2% of lids they tighten), but differ somewhat with regard to the latter—each pursuing their separate, preferred options for volume modification... thereby underscoring the versatility of o.h. under varying volumetric scenarios.

**METHODS**

Two retrospective reviews were conducted of 50 consecutive patients each (100 lids), who underwent o.h. between 2005 and 2010, one by each author. The data bases included age, sex, history of prior blepharoplasty, length of follow-up, extent of skin resection (per lid), lateral canthal manipulations (canthoplasty and canthopecty), fat-bag reduction or repositioning, suborbital volume addition, skin resurfacing, complications and their treatment, and reoperations. While there was no IRB approval for this study, informed consent was acquired from all patients and the study followed the tenets of the Declaration of Helsinki.

**Plastic Surgical Technique**

During history and physical examination, lid position and tone, as well as volume deficiencies are noted, and herniated fat bags assessed for reduction (6%). A measure of orbicularis descent is made by pinching together eyelid skin and muscle some distance below the lateral canthus and lifting vertically to that structure, without creating tension. If the excursion of this "skin-muscle suspension test" remains <5 mm, o.h. will not be recommended (except, perhaps, in the fastidious patient) and treatment will be limited to microstructural fat grafting with conservative laser resurfacing. If blepharoplasty will be recommended, vector analysis is conducted, snap test performed, and lid distraction from the cornea estimated. Of these, the most informative remains lid distraction, which best predicts the need for either nasal lid margin shift or horizontal lid tightening. When indicated, ophthalmologic and/or anesthesiology consultation is obtained.

The day of surgery, the preoperative sitting patient is marked with a dot below the lateral canthus at the distance estimated for orbicularis suspension. This mark is tested and adjusted to eliminate redundancy from the lid in its elevated (but tension-free) position. The creation of upward tension within the lid and upper cheek during testing and marking would likely lead to excessive skin resection and postoperative lid retraction, which otherwise should not occur (Video 2, which demonstrates marking and the surgical technique, is available as Supplementary Material at www.aestheticsurgeryjournal.com). An arc is drawn from the medial caruncle through the dot. A short, oblique line joins the lateral arc from the lateral subciliary margin. An imagined (undrawn) subciliary line completes the triangle for skin excision. Once determined, this pattern of skin resection is not altered intraoperatively, except for lateral dog-ear adjustment. Contour lines are added below as guides to structural fat addition. Lid distraction is measured in the supine patient under general anesthesia from cornea to gray line with a paper tape. Local anesthetic with epinephrine is instilled. Volumetric deficiencies within the suborbital zone are augmented by microstructural fat grafting with fine blunt needles, typically adding 6 cc. of prepared fat per side. The inferior and oblique lines of the skin triangle are incised with a Fine blade, and the subciliary component completed with sharp, curved scissors, hugging cilia. The skin of the triangle is rapidly removed, leaving subjacent muscle intact (Figure 1). If fat is to be removed (6%), such is undertaken with particular conservatism via stab-wound buttonholes through the exposed muscle coat. A 6 to 7 mm buttonhole is then spread through the lateral muscle with the same scissors 1 to 2 mm below the superior skin border overlying the orbital rim. The scissors are introduced through the muscle aperture and directed superiorly, where the tips are used to palpate the lateral orbital rim at the canthus. Two or three snips are made superficial to periosteum to expose the rim at the level of the lateral canthus. No other dissection is performed, and specifically no “release” is made at or below the inferior orbital margin. The transverse buttonhole is
opened between hooks and shifted superiorly to overlie the lateral rim at the canthal level. A 5-0 permanent monofilament suture is introduced from inside-out through the periosteal rim (without “internal” placement). To ensure symmetry, the level of suture placement is compared between the two sides by a “suture distraction test”: after suture placement, the skin hooks are removed and the buttonhole returned to its unsuspended position; the suture is distracted away from the orbit (at a perpendicular), first to test the adequacy of the suture bite, but also to assess the level of suture placement around the arc of the lateral orbital rim. The properly positioned suture will, when distracted, lift the superior skin margin (just above the muscle buttonhole) a distance of 2 to 3 mm. If there is no such lift (or excessive lift), the suture is withdrawn and repositioned. The “hitch” is completed by passing the suture through the lateral-most muscle coat just above the inferior skin border (from inside-out) and returning mattress-style (from outside-in) some 4 to 5 mm medially. In no case has this muscle bridge failed to hold lid position, even when the access myotomy has been situated only a few millimeters superior and medial. Early in the experience, one lid of a heavy-set male weight-lifter descended in the immediate postoperative period; on examination under local anesthesia in the office, the 5-0 suture was found broken and was replaced with a 4-0 substitute ... without further consequence. The suture position is occasionally “hyper-placed” along the orbital rim some extra millimeters above the canthus (best determined by the same “suture distraction test”) to address existing bowing of the lateral lid or mild scleral show (assuming an absence of lid retraction) ... or a desire by the occasional patient for a more stylized outcome. After the suture is tied and cut (precisely on the knot), a short sweep of the lateral-most inferior skin margin is freed 2 mm from the muscle coat (to avoid minor skin depression).

The improved lid distraction is re-measured: if <5 mm, the lid is closed (Video 2); if more than 10 mm (rare), horizontal lid tightening is required by “tarsopexy” or other means; if between 5 and 10 mm, the lid margin is advanced

![Figure 1. Lower blepharoplasty by orbicularis hitch. (A) Subciliary skin triangle has been excised and buttonhole myotomy has been made below canthus by spreading scissors through muscle coat. (B) Orbital rim has been exposed with sharp scissors. (C) Buttonhole has been elevated and opened with hook; hitch suture, which has been brought through lateral orbital rim periosteum at canthus—and then “out-and-in” through lower, lateral exposed muscle coat, is ready to tie. (D) Suture has been tied and cut (suture knot indicated beneath skin).](https://academic.oup.com/asj/article-abstract/36/6/641/2664489)
nasally before closure. The mid-portion of the tarsus-bearing lid margin is grasped with forceps and advanced medially, while the lower segment is drawn laterally. The new relationship between the skin margins is fixed with a 6-0 fast-absorbing gut suture placed through skin and lid substance (tarsus and muscle). This advancing maneuver is repeated once or twice to either side of the central suture, as the linear disparity between the laxer upper (pre-tarsal) segment is re-distributed along the full sweep of the tauter lower (preseptal) segment. Too abrupt a shift may distort the lid margin, requiring replacement of sutures. Adequate nasal lid-margin shift will almost invariably bring lid distraction to <5 mm, allowing closure (Video 1, a dynamic schematic of surgical technique, is available as Supplementary Material at www.aestheticsurgeryjournal.com). All but 5% of darker lids are treated with single-pass, low-density CO2 laser resurfacing (UltraPulse, Lumenis, Yokneam Israel) at 100 millijoules/60 watts, with computer pattern generator density of 4), an adjuvant that has remained essentially sequela-free at this conservative energy level. History of prior lid resurfacing disqualifies the addition of laser. Lateral 6-0 nylon horizontal suture tarsorrhaphy via gray lines (from the level of the lateral corneal limbus to near the canthus) for six days has been added for more than a decade, effectively eliminating problem chemosis. Postoperative care includes iced saline compresses to the eyes for two days and regular removal and reapplication of greasy ointment by cotton-tipped applicator to the lasered eyelid skin for eight days. Neither eyelids nor fat-graft recipient sites are manipulated for 10 days.

Oculoplastic Surgical Technique

The oculoplastic surgeon treats the suspensory aspects of lower blepharoplasty precisely as the plastic surgeon does—by o.h.; however, his approach to volumetric alterations within the lid remains at times different, as do his preferences for occasional added lid support beyond that provided by o.h. Skin excision is measured and executed as described above. Fat pads are gently freed transconjunctivally, allowing their sculpture, resection, or repositioning, as indicated. For the last of these, pre-periosteal dissection is carried 10 mm below the inferior rim. A 6-0 monofilament suture is passed through skin and woven through the mobilized medial and, less commonly, central fat, before exiting; as the suture is tied, fat is repositioned intra-SOOF, over the rim.16 As mentioned, volume is increasingly added of late by fat grafting (in both the traditional deeper, as well as more superficial,7 plane). In most cases, the hitch (now with 5-0 vicryl) is sufficient in providing lateral canthal support. If particular laxity has been diagnosed preoperatively, additional tightening is carried out as a 5-0 vicryl suture canthopexy or, less commonly, tarsal-strip canthoplasty. Neither skin resurfacing nor suture tarsorrhaphy are added.

RESULTS

Plastic Surgical Results

The plastic surgeon finds that dynamic video comparisons (with patient speaking, smiling, frowning) document the benefits of o.h. with volume enhancement better than still photographs17 (Videos 3-6 are available as Supplementary Material at www.aestheticsurgeryjournal.com). Two overseas and two out-of-town male patients were last seen 3 weeks or less after surgery, two of whom were blepharo-plasty experts (a plastic surgeon and an oculoplastic surgeon); all reported long-term positive outcomes without complaint. Four patients were seen 3 months after surgery and the remainder 6 or more months after; the longest follow-up was 5 years (mean, 17 months). The mean patient age was 55 years (range, 30-74 years) and 7 (14%) were male. Seventeen (34%) secondary cases had undergone one or more prior blepharoplasties. Volume was added to the suborbital zone by microstructural fat grafting in all cases (100%). A small amount of fat was removed from 3 patients (6%). The amount of lid skin resected ranged from 3 to 20 mm (mean, 8 mm). Horizontal lid tightening was performed by “tarsopexy” in one lid of each of 2 patients (2%). Conservative laser resurfacing was added to the lids of 35 women; 8 were excluded by a history of prior resurfacing, deep pigmentation, or refusal. Four men opted for the addition. There were no lid malpositions and no lid reoperations.

Oculoplastic Surgical Results

The mean follow-up time in the oculoplastic surgical group was 16 months (range, 3-72 months) (Figure 2 and Supplementary Figures 1-3). The mean patient age was 55 years (range, 33-69 years) and 5 (10%) were male. Five (10%) secondary cases had undergone prior lower blepharoplasty. Fat pockets were transferred to a deficient suborbital zone by repositioning in 20 patients (40%) and reduced conservatively in another 30 (60%). The amount of lid skin resected ranged from 2 to 15 mm (mean, 5 mm). Horizontal lid tightening was performed in 3%: by tarsal strip in both lids of 1 patient and suture canthopexy in 1 additional lid. There was 1 lid malposition (1%), treated by early repositioning of the suture (that would likely have resolved without surgery) and no other lid reoperations.

DISCUSSION

Lower blepharoplasty remains challenging among routine cosmetic operations, both in the elusiveness of its ideal aesthetic outcome, as well as its propensity for complication and reoperation, especially for lid malposition with or without retraction or ectropion. In order to avoid these, it has been frequently recommended to tighten the lid at the lateral canthus.
(canthopexy or canthoplasty) and to limit skin excision. While such routine practices may give comfort, they may also create new functional and cosmetic concerns in their own right, including canthal distortion or asymmetry, granuloma formation, and transient (or lasting) unnaturalness, as well as inadequate treatment of redundant skin, descended muscle, and—ultimately—lower-lid aging itself.

Orbicularis suspension by a single suture allows safe resection of the large amount of redundant skin that typically accompanies significant orbicularis descent, as it also nearly eliminates the need for horizontal lid-tightening procedures at the lateral canthus. While suture fixation of descended preseptal muscle to lateral orbital rim proved nearly universal in preventing vertical lid malposition, a transient horizontal buckle of the lateral-most lid away from the globe occasionally occurred in early cases. As Hidalgo confirms, "...temporary distraction of the lateral canthus can occur with muscle flaps." When significant skin excision and muscle elevation is undertaken during o.h., it is only the lower, preseptal muscle that is repositioned at the lateral orbital rim; the pretarsal muscle of the lid margin is not directly involved in the hitching maneuver. Thus, while preoperative lid distraction is regularly reduced by the hitching maneuver, direct elevation of preseptal muscle may have tightened this lower segment of the lid more than the unmanipulated pretarsal segment of the free border. If lid closure is then begun at the nasal caruncle and extended by rote toward the lateral canthus, any disparity in limb length between the upper (looser) lid margin compared with the lower (tighter) preseptal one is brought laterally, to accumulate near the canthus, less as a "dog-ear" than a lid-margin buckle away from the globe. An analogous circumstance occurs during abdominoplasty, when closure is begun centrally and extended by rote laterally, bringing an inevitable superior-margin "dog-ear" accumulation that then requires extension of the scar for resolution. The practiced surgeon avoids this predictable trap by first redistributing superior-margin length disparity medially (toward the umbilicus) with a few well-positioned sutures, before executing a rapid, running closure. In the eyelid circumstance, the traditional remedy recommends horizontal tightening of the longer (looser) pretarsal free margin toward Whitnall's tubercle at the lateral canthus ("tarsopexy" or other form of canthopexy). A simpler remedy, however, remains the same redistribution of length disparity between upper and lower margins by advancing the upper (pretarsal) margin nasally (toward the caruncle) against the temporally-directed lower (preseptal) lid; after confirming improved lid-distraction, a rapid, running closure can follow without lateral buckle. Incidentally, the plastic surgeon has selected out less-challenging lids from his series by excluding from surgery those presenting < 5 mm of orbicularis descent (the vast majority of lids seen within his practice), a selection that explains his higher average skin resection of 8 mm per lid (this despite the re-operative status of one-third of his cases) compared to that of his oculoplastic colleague (5 mm per lid). Said another way, while the plastic surgeon now removes skin from the lower lid only occasionally, when he does so... he tends to remove a lot.

When indicated by the "skin-muscle suspension test," larger resections of skin can be safely executed during the hitching maneuver, with attendant re-suspension of lower preseptal and orbital orbicularis systems, all the while limiting surgical invasion into either the lid or the orbit. That this determination can be made preoperatively simplifies intraoperative planning and technical execution significantly. The only caveat remains that tension must be avoided during testing. The beginning surgeon should begin skin resection and muscle suspension conservatively, increasing only as experience and confidence are gained. Among our combined series of 200 lids, skin resections of 17, 18, and 20 mm were recorded, but only where adequate suspension of muscle laxity required it (two of these were performed on a plastic-surgical peer, the other on a lay...
remaining following closure. In this regard, it resembles only enough to allow elevation of descended muscle how much skin excision one can skin is excised only to allow re-suspension of redundant muscle coat. In other words, no effort is made to excise any particular quantity of skin (and certainly not to see how much skin excision one can “get away with”), but only enough to allow elevation of descended muscle (without tension). Contrasted with traditional techniques that develop skin or skin-muscle flaps, o.h. presents a “no-flap” technique, with no delaminated lid component remaining following closure. In this regard, it resembles “skin pinch” techniques, albeit with greater skin excision... but without the obligatory lateral canthal manipulation and tightening.24 The absence of any under-mined segment within the postoperative lid permits the skin resurfacing of choice over the entire lid.

With many subciliary approaches to lower blepharoplasty, there remains concern about potential muscular denervation (especially of pretarsal orbicularis) on a transient—if not permanent—basis.25 With an approach that limits disruption of the muscle coat to a lateral "buttonhole" stab-wound and blunt scissors spreading to the lateral orbital rim, there is little chance of such a sequela; this remains in contrast to skin-muscle flaps with orbicularis suspension, in general, and to orbicularis strap-flaps, in particular.11-13,26-31

Even in the earliest of these, orbicularis was divided and resected across the full sweep of the lid, with skin freed from remaining muscle to allow separate vectors for each. Also, in each of these precedent techniques, muscle was plicated (after excision or strap-flap exterpolation) to its new position. In o.h., by contrast, the muscle sheet is neither incised, excised, nor plicated, but is instead imbricated (stacked by over-lapping) as an intact lamella, allowing redundant muscle to distribute itself at random. Thus o.h. shares with these only a rigid fixation of the muscle coat to the lateral orbital rim; it differs in its vector (purely vertical), its considerable muscle excursion (up to 20 mm), its composite relationship between muscle and retained skin (no skin freeing), its imbricalional (as opposed to exci-sional) treatment of muscle, and its avoidance of muscle tension and denervation. Furthermore, suborbital dissec-tion is often recommended during blepharoplasty to free or “release” tissues before they are elevated and secured into new position. But temporal descent of the orbicularis system is nearly universal during normal aging, abetted as it is by both the “glide-plane” nature of the underlying pre-zygomatic space, as well as the absence of skeletal support from the temporal (as contrasted with nasal) orbit. Reversal of this descent logically suggests simple re-suspension (without need for “release”) as a straightforward remedy; such has proven uniformly to be the case during o.h., where no such lower “release” is undertaken (even in suspensions approaching 20 mm). In addition to providing lid support after the safe resection of significant skin, o.h. also brings an element of contour improvement to the aging lower lid and suborbital profile through actions within each of the three lid segments: the imbrication or stacking (as opposed to excision or translocation) of orbicularis in the upper, pretarsal portion of the lid brings youthful fullness to this segment; the elevation and tightening of the middle, preseptal muscle coat brings external pressure to bear on existing orbital-fat herniation and volume excess, with concomitant contour improvement; and elevation of lower, infra-tear trough subcutaneous fat during re-suspension of orbital orbicularis contributes to at least partial restoration of that deficiency. Finally, the technical brevity of routine o.h. (typically fifteen minutes per lid) is especially appreciated by the plastic surgeon, as a significant majority of his blepharoplasties are performed as a component of extended facelift projects.

While the authors embrace a different range of approaches for volume restoration of the lower lid, they remain consistent in their approach to skin resection, muscle suspension, and lid support. They present o.h. for the routine treatment of cosmetic aging of the lower lid and suborbital zone of the typical patient, including those with mild lid deformities associated with prior blepharoplasty, such as lateral bowing and limited scleral show; they do not, however, recommend these techniques for the attempted reversal of more serious post-blepharoplasty deformities, such as lid retraction or ectropion, where more traditional and aggressive reconstructive remedies remain indicated, with or without spacer grafts and other appropriate adjuvants.

As a retrospective, nonrandomized case series, this study is limited by potential selection bias (despite the more stringent redundancy criteria of the plastic surgeon) and the absence of operative controls, such as patients who underwent forms of conventional blepharoplasty. Furthermore, results were evaluated clinically by the authors themselves, without objective measurement.

CONCLUSIONS

The authors’ separate experiences confirm that orbicularis hitch is a safe, simple, and effective procedure for suspension-based rejuvenation of the lower eyelid region. The technique allows the safe reversal of significant orbicularis oculi descent and equivalent lower-lid skin redundancy with limited surgical
invasiveness, as it also preserves muscle innervation and lateral canthal integrity. As they demonstrate with their contrasting protocols for overall lower lid rejuvenation, orbicularis hitch may be readily combined with orbital fat repositioning or reduction, as well as structural fat grafting by injection to achieve further volumetric adjustment, as well as the skin resurfacing of choice to the entire lid.

Supplementary Material
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