

Extended Transconjunctival Lower Eyelid Blepharoplasty with Release of the Tear Trough Ligament and Fat Redistribution

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Background: The transconjunctival lower eyelid blepharoplasty is advantageous for its quick recovery and low complication rates. Conventional techniques rely on fat removal to contour the lower eyelid. This article describes the authors' extended transconjunctival lower eyelid blepharoplasty technique that takes dissection beyond the orbital rim to address aging changes on the midcheek.

Methods: From December of 2012 to December of 2015, 54 patients underwent this procedure. Through a transconjunctival incision, the preseptal space was entered and excess orbital fat pads were excised. Medially, the origins of the palpebral part of the orbicularis oculi, the tear trough ligament, and orbital part of the orbicularis oculi were sequentially released, connecting the dissection with the premaxillary space. More laterally, the orbicularis retaining ligament was released, connecting the dissection with the prezygomatic space. Excised orbital fat was then grafted under the released tear trough ligament to correct the tear trough deformity. When the patients had significant maxillary retrusion, structural fat grafting was performed at the same time.

Results: The mean follow-up was 10 months. High satisfaction was noted among the patients treated with this technique. The revision rate was 2 percent. Complication rates were low. No chemosis, prolonged swelling, lower eyelid retraction, or ectropion was seen in any patients.

Conclusion: The extended transconjunctival lower blepharoplasty using the midcheek soft-tissue spaces is a safe and effective approach for treating patients presenting with eye bags and tear trough deformity. (*Plast. Reconstr. Surg.* 140: 273, 2017.)

CLINICAL QUESTION/LEVEL OF EVIDENCE: Therapeutic, V.

The transconjunctival lower eyelid blepharoplasty offers an advantageous access to the lower eyelid and midcheek because of its safety (by avoiding trauma to the anterior lamella of the lower eyelid) and its quick recovery.¹⁻⁴ The goal of treatment for patients presenting with eye bags is to eliminate the "tired appearance." To effectively achieve this, in addition to eliminating the bulging fat in the lower eyelids, importantly, the lid-cheek junction and the tear trough deformity need to be addressed. Conventional transconjunctival lower eyelid blepharoplasty focuses on fat removal alone and does not specifically correct the tear trough deformity or smooth the

lid-cheek junction.⁵⁻⁷ Accordingly, it is generally satisfactory only for younger patients with true eye bag fat excess with minimal tear trough deformity, skin excess, and suborbital hollowing.

Recently, "extended" transconjunctival techniques have been advocated by several authors.⁸⁻¹⁵ The extended approaches take the dissection

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caudal to the orbital rim to correct the tear trough deformity and the palpebromalar groove. However, the extended transconjunctival approaches have not been widely used because of the limited visualization and uncertainty with the surgical anatomy of the midcheek as seen through the transconjunctival incision. Recent understanding of the midcheek anatomy, in particular, the description of the tear trough ligament and the premaxillary space,^{16–20} has provided the knowledge to approach the midcheek with more certainty and predictability from the transconjunctival approach. The dermal insertion of the tear trough ligament is the main anatomical cause of the tear trough deformity.¹⁹ Surgical release of the ligament has been demonstrated to be the most important maneuver for correcting the deformity. By applying this anatomy, we have developed a method of performing this operation in an effective, safe, and predictable manner. This article details our experience with the use of our extended transconjunctival approach, using the midcheek soft-tissue spaces and precise release of key retaining ligaments, for the treatment of eye bags and the tired appearance.

PATIENTS AND METHODS

From December of 2012 to December of 2015, 54 patients underwent extended transconjunctival eye bag removal with fat redistribution and release of the tear trough–orbicularis retaining ligament complex. Fifty-two (96 percent) were primary cases. Of these patients, 29 (53 percent) had concomitant fat grafting to the midcheek performed together with the lower blepharoplasty. Other concomitant facial procedures performed for the patients during the same operation included upper blepharoplasty, rhinoplasty, and face lift.

Surgical Technique


Preoperatively with the patient upright, the location and amount of fat pads to be removed are determined and marked. (See Video, Supplemental Digital Content 1, which demonstrates our technique of extended transconjunctival lower eyelid blepharoplasty with release of the tear trough ligament and fat redistribution, available in the “Related Videos” section of the full-text article on PRSJJournal.com or, for Ovid users, at <http://links.lww.com/PRS/C257>.) The procedure can be performed under either local or general anesthesia. The cornea is anesthetized with two drops of Alcaine 0.5% eye drops (Alcon-Couvreur,

Puurs, Belgium). The cornea is lubricated with some Duratears (Alcon-Couvreur), and a protective corneal eye shield is placed. The conjunctiva, lower eyelid, and midcheek are anesthetized with a mixture of 10 cc of 1% ropivacaine, 10 cc of 1% lignocaine, and 0.25 cc of 1:1000 adrenaline. The lower lid, midcheek, and lateral orbital rim are infiltrated with a total of 3 cc of the local anesthetic mixture on each side.

With two fine skin hooks applying gentle upward traction on the lower eyelids, an approximately 15-mm transconjunctival incision is made approximately 2 mm inferior to the lower edge of the tarsus using a sharp point diathermy, incising through the conjunctival and lower eyelid retractors. The skin hooks are replaced by a small, insulated Desmarres retractor. Using blunt tenotomy scissors, the preseptal plane is first developed. The orbital septum is then opened directly over the areas where the fat pads would be removed. The orbital fat pads are excised as indicated and meticulous hemostasis is performed.

The Desmarres retractor is replaced with a blunt end of the cat’s paw retractor and the preseptal space is then bluntly developed to its boundaries with a gentle sweeping motion with a cotton bud, while carefully looking for the white line that defines the location of the arcus marginalis. A key landmark, the origin of the palpebral part of the orbicularis oculi, is located slightly caudal to the arcus marginalis. With the assistant holding the retractor upward and the surgeon pushing the orbital septum down with the cotton bud, the orbicularis oculi is sharply released with



 Video Available Online

Video. Supplemental Digital Content 1, which demonstrates our technique of extended transconjunctival lower eyelid blepharoplasty with release of the tear trough ligament and fat redistribution, is available in the “Related Videos” section of the full-text article on PRSJJournal.com or, for Ovid users, at <http://links.lww.com/PRS/C257>.

cutting cautery at its bony origin. The palpebral part of the orbicularis oculi, the tear trough ligament, and the orbital part of the orbicularis oculi are released sequentially, taking care that the

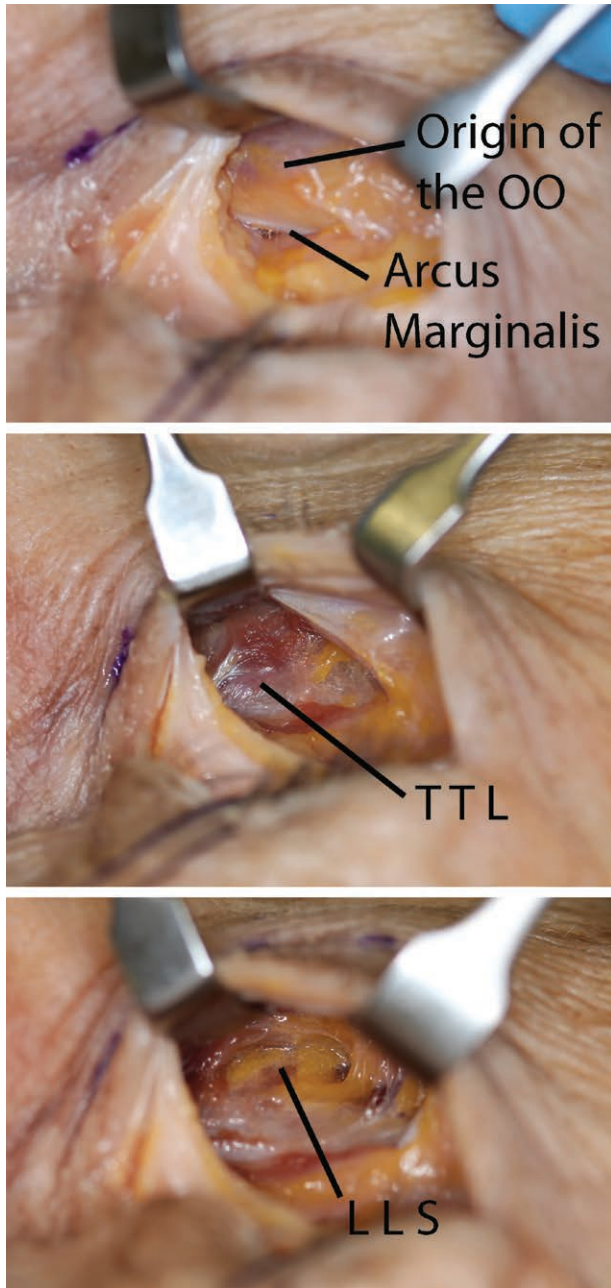


Fig. 1. Cadaveric demonstration of the release of the tear trough ligament (TTL) by means of the transconjunctival approach. The palpebral part of the orbicularis oculi (above), tear trough ligament (center), and orbital parts of the orbicularis oculi (OO) were released sequentially. The entrance into the premaxillary space is heralded by the visualization of the levator labii superioris (LLS) in the floor of the space (below). This indicates that the tear trough ligament has been completely released, surgically connecting the preseptal space with the premaxillary space.

dissection stays close to the anterior maxilla. The endpoint of the release is visualization of fibers of the levator labii superioris, which herald the entrance into the premaxillary space and accordingly the complete release of the tear trough ligament (Figs. 1 and 2). More laterally, the medial part of the orbicularis retaining ligament is also released. Figures 3 and 4 illustrate the surgical anatomy of the midcheek and the path of our surgical dissection, respectively.

The excised fat is then placed under the tear trough ligament as free fat graft and secured with 6-0 Vicryl percutaneous sutures (Ethicon, Inc., Somerville, N.J.). These are secured with Steri-Strips (3M, St. Paul, Minn.). The conjunctival incision is closed with two or three buried 6-0 plain catgut sutures. Figure 5 illustrates the correction achieved after completion of the procedure with release of the tear trough ligament and fat redistribution. Midcheek structural fat grafting, if indicated, is then performed using the Coleman technique.

Postoperative Care

The percutaneous Vicryl sutures are taped down with Steri-Strips, and these may be cut flush with the skin at 24 to 48 hours after surgery. To reduce bruising and swelling, the lower eyelids and cheeks are taped with Steri-Strips for 3 to 4 days.

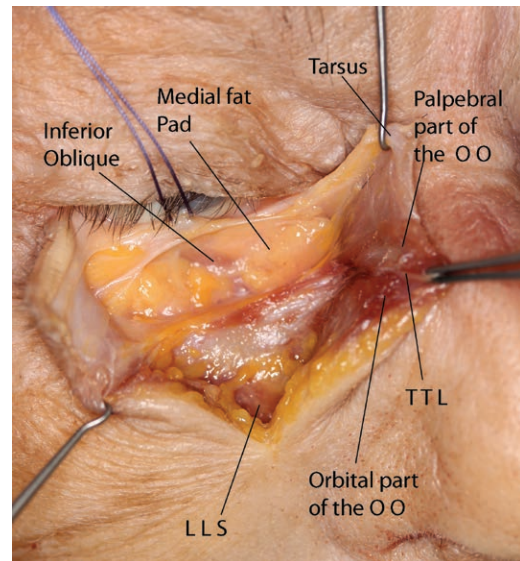


Fig. 2. With the dissection completed in the manner described, the lower eyelid was split vertically from the external skin to demonstrate the anatomy. The dissection connects the preseptal space with the premaxillary space, with the levator labii superioris (LLS) seen in the floor of the space, completely releasing the tear trough ligament (TTL) (held with the forceps). OO, orbicularis oculi.

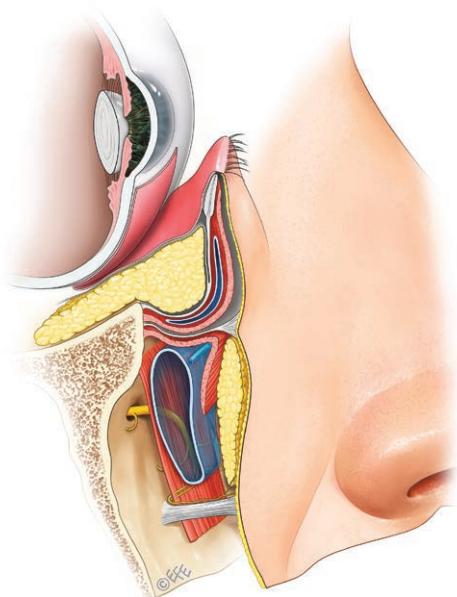


Fig. 3. Cross-section demonstrating the medial midcheek soft-tissue spaces and retaining ligaments. The preseptal space is separated from the premaxillary space by the tear trough ligament and origins of the orbicularis oculi associated with it. (Printed with permission EFE.)

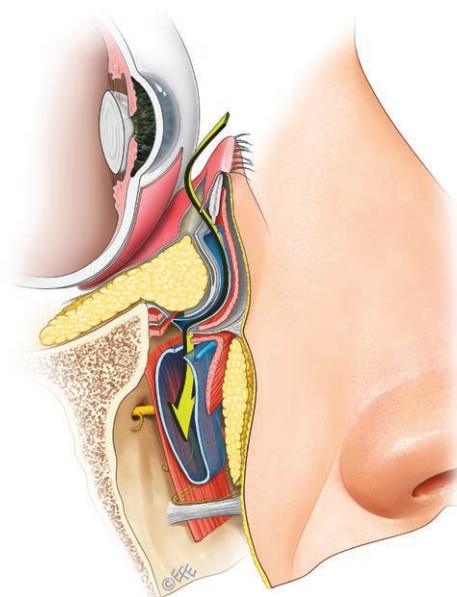


Fig. 4. The path of the dissection. (Printed with permission EFE.)

RESULTS

The mean operative time for the lower eyelid procedure alone was 42 minutes (range, 32 to 65 minutes). Fat grafting, when required, adds 25 to 40 minutes to the procedure. The mean follow-up was 10 months (range, 5 to 38 months). Figures 6 through 11 show the results of patients exhibiting a range of aging changes and anatomy operated on using this technique. The revision rate was 5 percent (three of 54); revisions were for small residual bulges, usually of the lateral fat pads.

Complications

Complications were rare. One patient had a corneal abrasion from inadequate lubrication with the use of the metal eye shield that resolved completely within 24 hours. One patient had a tiny bulge from a small hematoma around the inferior oblique muscle that resolved spontaneously. No chemosis, prolonged swelling, lower eyelid retraction, or ectropion was seen in any patients. Five patients (9 percent) complained of palpability/lumpiness of the grafted fat in the initial postoperative period. All resolved spontaneously within 4 to 8 weeks.

DISCUSSION

Conventional transconjunctival lower eyelid blepharoplasty techniques are generally effective for

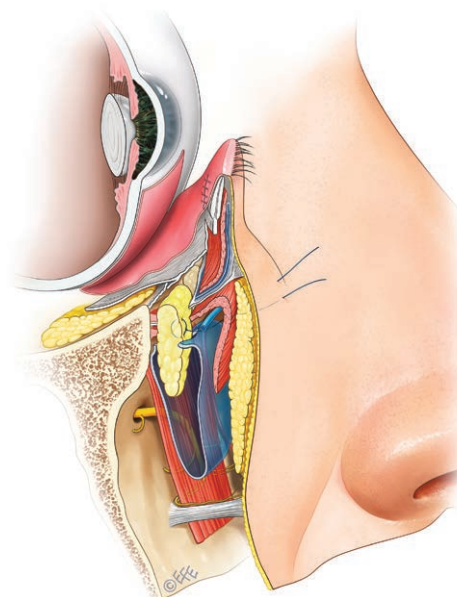


Fig. 5. Correction achieved at the completion of surgery. (Printed with permission EFE.)

younger patients with true eye bag fat excess. When more significant aging changes are present (with prominence of the lid-cheek junction, tissue descent, and skin laxity), many authors prefer the transcutaneous approach, incorporating some form of cheek lift into the procedure.^{21–27} However, there is a large group of patients with milder aging changes, prominent eye bags, a significant tear trough deformity, and orbital rim indentations that may be treated with the “extended” transconjunctival approaches, with



Fig. 6. A 31-year-old woman presented with eye bags and a prominent tear trough deformity. An extended transconjunctival lower blepharoplasty with tear trough ligament release and fat redistribution was performed. She is shown here preoperatively and 1 year postoperatively.



Fig. 7. A 34-year-old patient presented with eye bags and the tired appearance. She underwent transconjunctival lower blepharoplasty with tear trough ligament release and fat redistribution and midcheek and upper eyelid fat grafting. Sharp needle interdermal fat grafting was also performed. She is shown here preoperatively and 1 year postoperatively. Note the improvement in the tear trough deformity and elimination of the lid-cheek junction and improvement of the dark eye circles, giving a fresher and more youthful appearance.



Fig. 8. A 40-year-old woman presented with a very tired appearance. She underwent transconjunctival lower blepharoplasty with tear trough ligament release and fat redistribution and midcheek and upper eyelid fat grafting. She is shown here preoperatively and 1 year postoperatively.



Fig. 9. A 44-year-old man with periorbital aging. He underwent the extended transconjunctival lower blepharoplasty. On the right, the medial and middle fat was excised. On the left, fat was excised from all three compartments. The tear trough ligament and orbicularis retaining ligament was released and the excised fat was grafted under the ligaments. Upper eyelid blepharoplasty was performed at the same time. He is shown here preoperatively and 1 year after surgery.

excellent aesthetic results.^{8,10,14} The transconjunctival approach as described here is a version of the extended technique, using recent understanding of

the retaining ligaments and facial soft-tissue spaces of the midcheek to perform the surgery in an effective and anatomically logical manner.



Fig. 10. A 61-year-old man presented with eye bags. He had significant skin laxity and photoaging. He underwent an extended transconjunctival lower blepharoplasty with release of the tear trough ligament and fat redistribution and midcheek fat grafting. He is shown here preoperatively and 1 year after surgery.

Release of the tear trough ligament is a key maneuver in rejuvenation of the midcheek.^{19,27–29} The importance of this maneuver may be clearly demonstrated in patients whose appearance becomes “less attractive” when they smile. These are typically patients with hypertrophic orbicularis oculi, small eye bags at rest, and maxillary retrusion. With animation, strong contraction of the periorbital muscles squeezes the retro-orbital fat pads forward and medially against the tightly fixed tear trough ligament, increasing the bulging of the eye bags and prominence of the tear trough deformity. Removal of the eye bags alone, which has the effect of reducing the bulge, offers only a partial solution. With release of the tear trough ligament and orbicularis origins, the tethering effect is significantly eliminated and the dynamics of the smile are changed. This change in vectoring of the action of the orbicularis oculi gives a more relaxed and aesthetically pleasing smile (Fig. 11, *below*).

The postseptal variant of the transconjunctival approach provides the most direct access to the retroseptal fat pads, making fat excision easier and quicker, and is therefore the preferred approach for techniques that focus on fat excision.^{6,30–32} In contrast, the preseptal variant is the preferred plane of dissection to access the midcheek.³³ The preseptal space (preseptal dissection plane), like

other facial soft-tissue spaces in the face, can be bluntly opened to its inferior boundary, formed by the origins of the orbicularis oculi medially and the orbicularis retaining ligament more laterally. Key landmarks, the arcus marginalis and the origins of the orbicularis oculi just inferior to it, are easily located once the preseptal space is fully opened. In addition, the orbital fat pads do not prolapse into the operative field thereby obscuring visibility in this tight area, as tends to be a problem with the retroseptal approach. Significantly, as demonstrated by Schwarcz et al., the retroseptal and preseptal approaches in transconjunctival blepharoplasty have similar low complication rates.³⁴ To preferentially enter the preseptal space, the transconjunctival incision is located farther from the fornix, approximately 2 mm below the tarsus as described above.³²

When the preseptal space is fully opened and with the orbicularis under tension, the muscle (and the closely associated tear trough ligament) is released, staying close to the anterior maxilla while applying upward retraction on the tear trough ligament. This is important, as the blood vessels (the angular vein and artery) are located in close relation, on the underside of the orbital part of the orbicularis oculi close to its origin, and therefore need to be lifted out of the way of the dissection.²⁰ The extent of the release is determined preoperatively,



Fig. 11. (Above) Before-and-after photographs at rest. A 33-year-old woman presented primarily with the concern of prominent eye bags when smiling. The extended transconjunctival lower eyelid blepharoplasty was performed. (For the operation, see Video, Supplemental Digital Content 1, <http://links.lww.com/PRS/C257>.) At 6 months after surgery, note the elimination of the eye bags and augmentation of the anterior maxilla with good survival of the free fat grafts. (Below) The benefit of releasing the tear trough ligament is evident when the patient smiles. The tethering and scrunching centered at the tear trough ligament is eliminated, resulting in a more relaxed and aesthetically pleasing smile.

by marking the indent of the tear trough deformity and its lateral extension as the palpebromalar groove. With the right eye as a reference, this release usually extends from the 4-o'clock to the 8-o'clock

position (Fig. 12). Medially, the release should not extend medial to the 4-o'clock position, as in this area the angular nerve (which innervates the inner canthal orbicularis, glabella, and procerus) and the

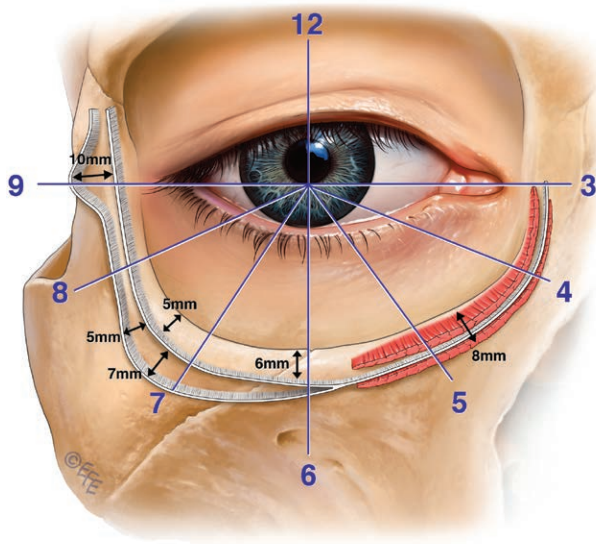


Fig. 12. Release of the tear trough–orbicularis retaining ligament complex generally extends from the 4-o'clock to the 8-o'clock position. (Printed with permission EFE.)

angular artery and vein become very closely associated with the tear trough ligament and are at risk of injury.³⁵ Release of the more lateral part of the orbicularis retaining ligament, beyond the 8-o'clock position, is rarely necessary.

To prevent reattachment of the ligament to the anterior maxilla and to correct retrusion of the maxilla here, fat excised from the “eye bags” is placed under the tear trough ligament as free fat grafts. Free fat grafting of the excised orbital fat, in contrast to fat flap transposition through the transconjunctival approach,³⁶ has several advantages. An inherent difficulty with the fat flap transposition is matching the two separate but linked objectives of fat bag reduction of the lid with the maxillary augmentation below. In the free fat grafting technique, the surgeon first obtains the correct lid contour by precise removal of the excess orbital fat. Then, separately, excised fat of the appropriate amount is grafted to the precise positions indicated under the tear trough ligament and upper part of the premaxillary space. It is technically easy to perform this even through the 15-mm transconjunctival incision. The free fat grafting approach has been used effectively by Marten in transblepharoplasty corrugator resection surgery in preventing volume loss and reattachment of the divided corrugators.³⁷ The long-term viability of the free fat grafts can be seen in our long-term results.

Patient selection is an important consideration. Figure 6 shows an ideal candidate for this procedure. These are younger patients with aging

changes occurring primarily over the medial mid-cheek, with eye bags, a prominent tear trough deformity, and maxillary retrusion. The wide bizygomatic width, with good support provided by the strong body of the zygoma, is responsible for the minimal descent of the cheek soft tissues, negating the need for a midcheek lift, which is the main advantage of the transcutaneous approach.^{21–27} In patients with more significant maxillary retrusion (as demonstrated in the patient shown in Fig. 7), additional midcheek augmentation with fat grafting would be needed to give a more profound rejuvenation. Figures 9 and 10 demonstrate the use of this technique in older patients with moderate and significant skin laxity, respectively. As shown here, the procedure delivers a level of results that is very satisfying.

CONCLUSIONS

The transconjunctival approach offers a safe access to the lower eyelid. Our extended transconjunctival technique, using the concept of dissecting through the facial soft-tissue spaces of the midcheek with precise release of the retaining ligaments that separate them, is effective in rejuvenating the upper midcheek, with correction of tear trough deformity and eye bags while minimizing bruising, swelling, and downtime.

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PATIENT CONSENT

Patients provided written consent for use of their images.

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