

Lateral Canthoplasty Using the Mitek Anchor System

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Abstract

Background Lower-eyelid shape and position have important aesthetic and functional implications. While primary canthoplasty is generally a straightforward procedure, secondary canthoplasty can be considerably challenging. This is especially true in the setting of poor periorbital tissues and the resultant lack of a stable platform from which to suspend the canthus. We report the first use of the Mitek device in secondary lateral canthal procedures to remedy this common problem.

Methods Twelve patients underwent a total of 19 revision lateral canthoplasties using the mini Mitek suture anchor system. All of the patients had had prior cosmetic and/or reconstructive surgery in the lateral canthal area with resultant canthal malpositioning. To correct this, suture anchors were placed into a 2-mm area of intact bone on the lateral orbital wall, and the lateral canthal tendon was resuspended into proper position.

Results In this series, there were no postoperative infections or patient reports of persistent discomfort at the anchor sites. All suture anchors remained in proper position postoperatively, and patients reported satisfaction with eyelid shape and function. Most of the patients reported resolution of their preoperative symptoms. Mean follow-up time was 24.2 months.

Conclusion The Mitek suture anchor is an excellent tool for lateral canthoplasty in patients with significant periorbital scarring or suboptimal canthal positioning after multiple cosmetic surgery procedures. It is also a good option

for patients with significant soft tissue damage owing to prior surgery, radiation, or trauma in the periorbital field. This technique can be performed quickly through small incisions and requires only a small amount of stable bone for tendon fixation. Results are excellent and the procedure has proven to be safe and effective in our series of patients.

Keywords Lateral canthoplasty · Lower-lid position · Mitek · Anchor

Lower-eyelid shape and position have important aesthetic and functional implications. Surgical management of lower-eyelid problems often includes canthopexy or canthoplasty to achieve appropriate eyelid tension and positioning. While primary canthoplasty is generally a straightforward procedure, secondary canthoplasty can be considerably challenging [1–3]. Tendon reattachment can be particularly problematic in the absence of intact periorbital tissues, incomplete or damaged bone and periosteum, or when the patient has substantial postoperative scarring. This is especially relevant for patients who have had multiple prior surgeries or in the setting of significant periorbital trauma [4, 5].

Complications of canthoplasty or canthopexy include canthal malposition and eyelid rotation abnormalities. These may produce ectropion, entropion, or lower-lid positional abnormalities in the anterior and posterior plane creating a gap or banding across the globe, respectively. All of these complications require revision to ensure appropriate canthal contour and eyelid function. Patients who have had prior canthal surgery may present with rounding of the canthus, eyelid retraction leading to scleral show, and/or ectropion [6, 7]. Some of these complications may be the result of technical error; however, many

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instances of poor canthal appearance occurs secondary to significant scarring, radiation therapy, or traumatic anatomical distortion. Revision is indicated in patients who present with dry eyes, corneal irritation, unacceptable aesthetic appearance, and/or visual field obstruction.

While the anatomy of the medial canthal tendon is more complex than that of its lateral counterpart, owing to its proximity to the lacrimal system, lateral canthal surgery is a far more common procedure in both the reconstructive and cosmetic surgery setting. The lateral canthal tendon is also significantly weaker than its medial equivalent [8], and tightening often requires excision of skin and other soft tissues. The most common procedure used for lateral canthoplasty is the lateral tarsal strip, originally described in 1979 [9]. This technique has been readapted for revision canthoplasty in patients who do not have residual laxity but do suffer from canthal malposition [10]. However, even modified tarsal resuspension procedures require intact lateral orbital periosteum for tendon reattachment and sometimes suffer from lid length discrepancy between the upper and laterally shortened lower-lid.

Although, the use of the Mitek suture anchor is well-described for medial canthoplasty, there are no published reports of its use for lateral canthoplasty. In patients with poor tissues in the medial orbital wall, this technique is less invasive and faster than other methods of medial canthal tendon reattachment, avoids accessing the nasal cavity or the contralateral orbit, and relies solely on the presence of a small amount of stable bone for fixation [4, 11, 12]. Suture anchors can be placed through small incisions, they allow for precise canthal positioning, and they do not require intact periosteum for support. We present the first published experience with Mitek suture anchor fixation of the lateral canthal tendon for use in late or secondary lateral canthoplasty.

Materials and Methods

Twelve female patients between the ages of 18 and 81 (mean age = 52) presented with lower-lid retraction and/or ectropion following previous cosmetic or reconstructive surgery between 2007 and 2009. Clinical symptoms upon presentation included dry eyes and visual field obstruction. All of the patients had had prior surgery and many had had multiple prior procedures. They all demonstrated postoperative canthal malpositioning and reported dissatisfaction with their appearance.

Patients were selected based on their history of prior canthal surgery and obliteration of normal anatomy as a result of scarring and/or soft tissue distortion. Patients with a history of facial trauma and those who had undergone multiple cosmetic surgery procedures on their lower



Fig. 1 Mini Mitek suture anchor

eyelids were included in the sample. Preoperative assessment was based on patient history and clinical examination. In each case, a permanent Mitek suture anchor (Ethicon, Inc., Somerville, NJ) was utilized for canthal fixation (Fig. 1).

The Mitek suture anchor system is available in three sizes, of which the mini is most suited to soft tissue fixation in the face. The mini Mitek suture anchor is a 1.8-mm-diameter, 5.4-mm-long tubular structure made of titanium alloy. The device has a hole through its superficial surface for suture placement. Once introduced into medullary bone, the anchor releases two barbs deep into the bony cortex. These barbs lock against the cortex, preventing anchor movement or dislodgment. The kit, which costs \$336.00, consists of a drill guide, anchor inserter, the anchor itself, and a 3–0 Ethibond ExcelTM suture (Ethicon) on a swaged needle.

Surgical Technique

The lateral upper-eyelid is infiltrated with local anesthetic and the area is prepped in the standard sterile fashion. A curvilinear incision is made in the lateral upper-eyelid crease at the level of the lateral orbital rim. The lateral retinacular elements are released in order to allow full mobility of the lateral canthal structures and the commissures of the eyelids. Dissection is carried out to the bony orbital rim and Whitnall's tubercle is identified. A 4 mm area of intact stable bone is isolated on the lateral orbital wall, in either an anterior or a posterior position with respect to the orbital rim and adjacent to Whitnall's tubercle. Anchor position is dependent on the appropriate targeted position of the eyelid with reference to the globe and the zygoma. The anchor is always positioned near the zygomaticofrontal junction, with reference to the cephalad/caudad plane.

A hole is drilled into the targeted segment of bone in preparation for anchor placement. This may be achieved with any low-speed, high-torque drill. We prefer a hand-held Benelli-type instrument. The anchor is then inserted into the drill hole, taking care to maintain the integrity of



Fig. 2 Mini Mitek suture anchor in lateral orbital rim

the swaged double-armed suture already attached. The lateral edge of the lateral canthal tendon is then engaged with the double-armed suture and tied down. Lateral canthal positioning should be targeted in a posterior and cephalic orientation compared with preoperative attachment in patients with ectropion and/or scleral show. Once the desired eyelid position is achieved, the subcutaneous tissues are closed over the Mitek using 4–0 chromic gut and the skin is closed using 5–0 nylon suture (Fig. 2).

Results

A total of 12 patients (19 eyelids) underwent revision lateral canthoplasty with the mini Mitek suture anchor system. Average operative time for anchor placement and canthal resuspension was approximately 20 min for one side. None of the patients experienced prolonged discomfort, postoperative infections, or anchor extrusion. One patient required revision due to persistent visual field obstruction laterally. Average follow-up time was 24.2 months.

Discussion

Revision canthoplasty is a challenging surgical endeavor, especially in the patient who has damaged periorbital soft tissues or bone and periosteum. In these cases there is no

appropriate target for tendon fixation. Patients who demonstrate significant scarring and canthal malposition are likely to be poor candidates for traditional lateral canthoplasty.

The Mitek suture anchor was originally developed for orthopedic surgery, as an adjunct to tendon reattachment. It allows stable fixation of soft tissue directly to bone, recreating the relationship between mobile structures in the absence of appropriate tendon and/or periosteum. The mini Mitek anchor is small and easily placed and requires only a small portion of stable bone for placement. Additionally, the Mitek anchor requires only one drill hole compared to the two holes required for traditional anchors. This makes the Mitek anchor useful in cases in which not only the soft tissue is disrupted, but also bone is compromised in form or structure. The maintenance of optimal lid and globe relational position is important when placing the anchor into bone, especially when the ideal bony substance is not anatomic. Once set into place, it rests below the surface of the bone and is easily covered with local skin and subcutaneous tissues. Its titanium construction renders it radiopaque, inert, and durable. Its use is easily mastered by the average surgeon. This makes it ideal for use in the orbital wall or on the face.

The Mitek suture anchor has yielded good results when used for medial canthoplasty. However, most published case series are limited to fewer than four patients, and none demonstrated its utility in lateral canthoplasty. We report excellent results with 12 patients (19 eyelids), many of whom had distorted anatomy, absent soft tissues, and severe scarring. Longer follow-up would be needed to examine the ultimate durability and outcome of these repairs, but initial results are very positive.

In our series, we used a small upper-eyelid incision to access the lateral orbital wall and rim. Mitek anchors can be placed in any small area of stable bone, which makes them very useful for other forms of soft tissue resuspension in the face and midface [13]. Anchor placement requires an incision of less than 2 cm, which limits postoperative morbidity; and the ease of placement associated with this type of fixation shortens operative time. Biomechanical studies of medial canthal tendon reattachment with this system suggest that 97% of canthal tendon strength is regained at the time of attachment [14]. Although we have not performed formal forced distraction studies, our results with lateral canthoplasty support this finding, as we have observed stable repairs in all patients for up to a 2-year follow-up. It is important to note that the anchor is a permanent implant, and removal requires excision of the bony platform as well. Furthermore, while we experienced no complications, the Mitek anchor, like any other device, requires proper knowledge and execution. In our experience, the learning curve is steep so we encourage the uninitiated to gain knowledge and expertise before

introducing it into their daily practice. We would also like to point out that in cases for which we recommend use of the Mitek anchor, the patients have already been severely compromised and, even in our hands, minor asymmetries persist despite uniform significant improvement. This supports published reports of the long-term durability of the repair in medial canthoplasty and our own findings with regard to lateral canthoplasty. Overall, this tool allows for a simplified approach and great versatility in soft tissue repositioning [8].

Previous published reports have demonstrated the successful use of the Mitek suture anchor in several areas of the face, including the medial canthus [15, 16]. However,

ours is the first formal report of its use in the lateral orbit for secondary canthoplasty.

Case 1

Case 1 is a 50-year-old female with no medical comorbidities. This patient had an extensive history of prior cosmetic surgery to the face and eyes. She presented with scleral show, dermatochalasis, and dissatisfaction with her appearance. Bilateral lateral canthoplasty was performed, with resolution of her symptoms. Follow-up time for her was 10 months (Fig. 3).

Fig. 3 Case 1 **a** Preoperative frontal view. **b** Postoperative frontal view

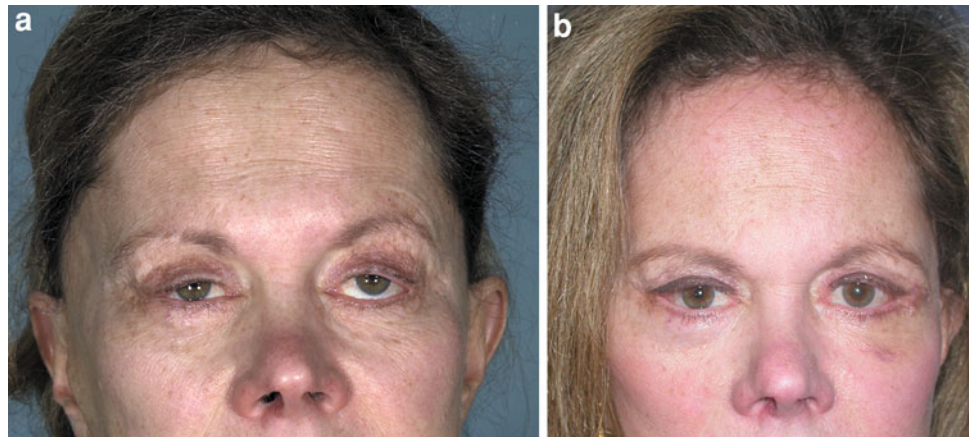


Fig. 4 Case 2 **a** Preoperative frontal view. **b** Postoperative frontal view

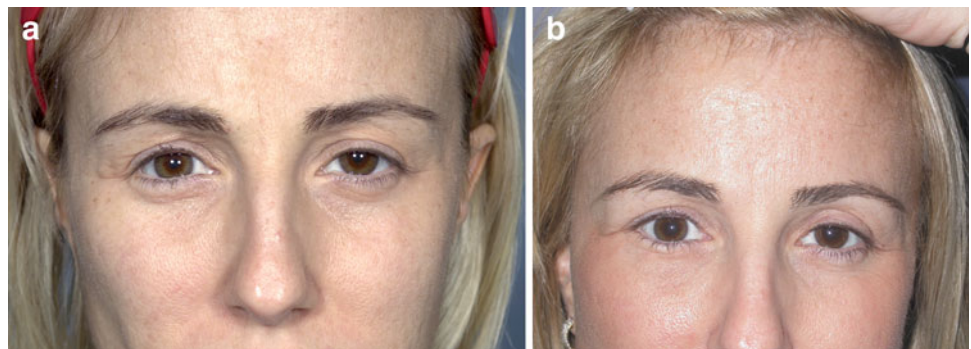
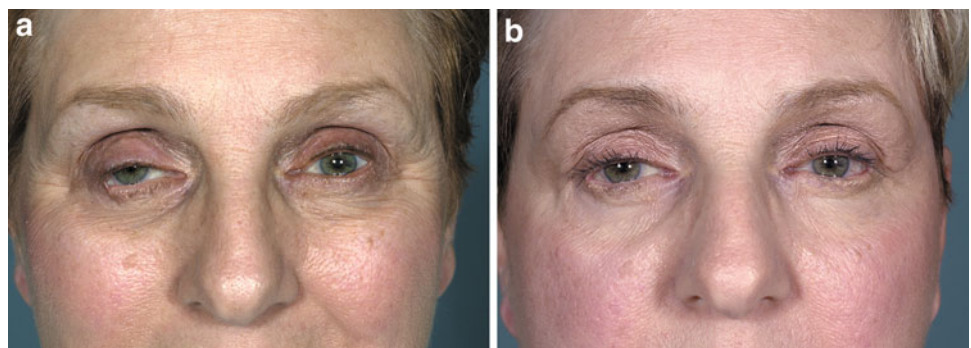


Fig. 5 Case 3 **a** Preoperative frontal view. **b** Postoperative frontal view



Case 2

This 34-year-old female had a history of facial trauma when she fell off a ladder onto a radiator. This patient had multiple prior surgeries, with significant resultant scarring and residual deformity. She demonstrated right-sided enophthalmos, dystopia, and contracture bands at her right lateral canthus. This patient underwent right lateral canthoplasty, with excellent results 7 months postoperatively (Fig. 4).

Case 3

Case 3 is a 61-year-old female with a history of multiple cosmetic surgery procedures, including blepharoplasty. The patient demonstrated bilateral scleral show, lateral canthal dystopia, and bilateral canthal webbing. She also suffered from ectropion and visual field obstruction. Lateral canthoplasty was performed with the mini Mitek suture anchor at the first surgical date. Initial results were aesthetically satisfactory; however, this repair required revision due to a small amount of residual visual field obstruction. Revision canthoplasty consisted of tarsal repositioning cephalad to the original suture anchor fixation. The patient is currently without complaint 16 months after her second surgery (Fig. 5).

Conclusion

The symptoms of lower-eyelid and lateral canthal malposition, including scleral show and ectropion, are difficult problems, especially in patients who have had previous lateral canthal suspension procedures and/or trauma. Patients who present with these problems may benefit from stable lateral canthal fixation in the setting of significant fibrosis and damage to periorbital soft tissues. Suture anchor fixation with the Mitek suture anchor system can be performed through minimal incisions and requires limited technical ability, while providing an aesthetically pleasing and stable repair. This technique is quick, safe, and effective and provides good long-term results. It belongs in the armamentarium of any surgeon who routinely performs procedures in the periocular region.

Disclosure The authors declare that they have no conflicts of interest to disclose.

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