Dynamic Diagnosis of “Fishmouthing” Syndrome, an Overlooked Complication of Blepharoplasty

Clinton D. McCord, MD; and Gabriele C. Miotto, MD

Abstract

Background: Dysfunction and/or dehiscence of the lateral canthus is 1 source of symptomatic eyelid closure disorder after blepharoplasty. Because the resulting concentric blinking movement resembles mouth closure in a fish, the name “fishmouthing” syndrome (FS) was given to this condition. Fishmouthing syndrome appears to be an overlooked complication of blepharoplasty.

Objectives: The authors performed dynamic assessments of patients who had eyelid discomfort after blepharoplasty to establish the clinical signs of FS.

Methods: Preoperative and postoperative videos of 36 patients who presented for secondary blepharoplasty were analyzed retrospectively. All 36 patients experienced symptoms of dry eyes and eye discomfort after their initial blepharoplasty and desired symptomatic and cosmetic improvement. The dynamic signs and diagnostic criteria for FS were established clinically and through video analysis of patients’ blinking movements.

Results: The most common clinical characteristics of FS included lash deformity (“cow lash” sign), abnormal medial displacement of the lateral canthus during blinking, deformity (rounding/narrowing) of the lateral scleral triangle, and visible eyelid closure deficiency or gapping. Other characteristics were lower-lid retraction and compensatory hypercontraction of the orbicularis oculi adjacent to the inner canthus.

Conclusions: Patients with FS present with a combination of clinical symptoms and signs and are best diagnosed through dynamic visualization of the animated tissue during blinking. Evaluation of preoperative videos is an essential tool for surgical planning and for analyzing the results, both before and after corrective surgery, in patients with potential FS.

Level of Evidence: 4

Keywords
drill-hole canthopexy, canthoplasty, blepharoplasty, dry eye, canthal dehiscence, fishmouthing syndrome, oculoplastic surgery

Inadequate eyelid closure following blepharoplasty can produce symptoms secondary to exposure and drying of the eye surface. In many cases, the cause of dysfunctional eyelid closure may be diagnosed without difficulty, such as in the presence of visible lagophthalmos, scleral show, or ectropion. Poor eyelid closure in these patients is commonly the result of tissue tethering due to skin deficiency (anterior lamella) or intrinsic eyelid stiffness secondary to cicatrical changes within the middle and posterior lamellae.1-7

Another cause of poor eyelid closure is dynamic dysfunction of the lateral canthus, wherein reduced tone of the lid attachments contributes to ocular dysfunction. Eyelid closure problems resulting from dehiscence and loss of support of the upper lid and lower lateral canthal attachments appear to be an overlooked complication in
blepharoplasty patients. Lateral canthal dysfunction may not be as detectable from static photographs as it is during active blinking. Therefore, for patients who present with ocular dysfunction after blepharoplasty, we recommend dynamic diagnostic evaluation with systematic analysis of eyelid blinking to detect signs of lateral canthal dehiscence, which we have termed “fishmouthing” syndrome (FS).

Normal blinking movement produces vertical closure and consists of contraction of the inner canthal orbicularis offset by a firm counter pull of the lateral canthal attachments of the upper and lower lids. Dehiscence or stretching of both upper- and lower-lid components of the lateral canthal tendon can cause an abnormal, medially oriented movement of the eyelid during blinking, resembling a concentric “fishmouth” movement, rather than the more vertically oriented movement that is characteristic of normal blinking (Figure 1).

Fishmouthing syndrome is most commonly recognized in patients who present with eyelid closure deficiency and complain of eye discomfort following blepharoplasty. The primary clinical symptom of FS is dryness of the eyes, which commonly occurs weeks or even months after surgery due to progressive laxity or dehiscence at the lateral canthus. Clinical signs of FS can be recognized during blinking and include inward pulling of the lateral canthus and eyelids toward the nose, compensatory hypercontraction of the medial canthal orbicularis oculi muscle accentuating vertically oriented lid rhytids, medial rotation and straightening of the upper-lid lashes, and incomplete eyelid closure with various degrees of gapping of the eyelids.

Static clinical signs of canthal dehiscence can be seen mostly in the lateral scleral triangle. The lateral canthus is often displaced medially, causing various degrees of rounding and/or narrowing of the lateral scleral triangle, with distortion of the shape of the eye. In addition, in many patients afflicted with FS, the upper-lid lashes are straight and medially rotated, which is accentuated by blinking. The change in lash curvature appears to be proportional to the degree of dehiscence of the upper-lid...
canthal tendon, and it is most noticeable in the lateral third of the upper-lid lashes. This eyelash deformity resembles the lashes of a cow (straight and medially oriented), which is why we have nicknamed it “cow lash deformity” (Figure 2).

The eyelid finger repositioning maneuver, performed at the lateral orbital rim, is an important diagnostic tool to determine whether canthal tightening could improve a patient’s FS. This maneuver involves pushing the lateral canthal tendons (upper and lower) toward the lateral orbital rim and may demonstrate how canthal tightening could improve both eyelid closure during blinking and lash position (Figure 3).

**METHODS**

The charts of 56 patients who presented to the authors’ private clinic for secondary blepharoplasty between 2003 and 2011 were retrospectively reviewed. All 56 patients who presented for secondary blepharoplasty over a period of 8 years had FS. All patients had undergone previous bilateral upper and lower blepharoplasty and sought relief of eye dryness and discomfort. Many of these patients also desired cosmetic improvement of their eyelid appearance.

Of the 56 patients diagnosed with FS, videos of blinking movements were preoperatively and postoperatively recorded for 36. Only these 36 patients were included in the present analysis. There were no other inclusion or exclusion criteria. Each author retrospectively analyzed all 36 videos in an effort to determine the dynamic signs of FS and to establish its diagnostic criteria.

**RESULTS**

Most of the patients (n = 32) were women, and the average age was 53 years (range, 45-65 years). Fishmouthing syndrome was observed at different degrees of severity, from subtle clinical signs in some patients to more severe and visible deformities in others. Subtle cases of FS were sometimes characterized only by symptoms of dry eye and eye irritation after previous blepharoplasty. In some subtle cases, eyelid gapping on closure was difficult to visualize.
Symptomatic patients with subtle FS complained that they knew something “wasn’t right” with their eyes but had received no diagnosis for the problem. Some of these patients whose eyes appeared “normal” on static examination had a disproportionate severity of symptoms between the appearance of eye shape and closure and level of symptoms, and subsequent observation of their blinking movements showed subtle clinical signs of FS.

Analysis of the preoperative videos showed changes in the shape and direction of the upper-lid lashes (cow lash deformity) in 32 of the 36 (88.8%) patients. Twenty-eight (77.7%) patients had abnormal medial displacement of the lateral canthus during blinking. Twenty-four (66.6%) patients had deformity of the lateral scleral triangle (rounding or narrowing), and 24 (66.6%) patients had visible eyelid closure deficiency or gapping. Compensatory hypercontraction of the inner canthal orbicularis was present in 20 (55.5%) patients, and lower-lid retraction (on 1 or both sides) was present in 21 (58.3%) patients. The latter was not considered a diagnostic criterion of the syndrome but rather an associated finding (Table 1). On the basis of our results, we propose diagnostic criteria FS in Table 2.

Two videos demonstrating a mild and severe case of FS, respectively, are available at www.aestheticsurgeryjournal.com. Seven other videos demonstrating dynamic evaluation of FS and the various degrees of severity, as well as surgical correction and postoperative appearance, are also available at www.aestheticsurgeryjournal.com. You may also use any smartphone to scan the code on the first page of this article to be taken directly to the videos on www.YouTube.com.

**DISCUSSION**

Although the term “fishmouthing” has been described briefly by one of the authors (C.D.M.) in previous publications,3,6 the importance of dynamic evaluation of patients with the syndrome and its primary diagnostic findings have not been fully explained elsewhere. Close attention to the lateral scleral triangle and shape of the eye fissure during blinking is key to the diagnosis of lateral canthal dehiscence causing FS. The evaluation of patient videos (rather than static photographs), both pre- and postoperatively to the secondary surgery, is an important tool in the clinical assessment of patients with eyelid closure problems after blepharoplasty. The videos helped us determine that acquired laxity or dehiscence of both upper and lower lateral canthal tendon components appears to be the main cause of FS and that establishing firm canthal tendon anchoring is fundamental to effective correction of the problem.

Denervation of the orbicularis oculi muscle has been cited as a cause of poor eyelid closure due to disruption of the zygomatic branches of the facial nerve, which can occur during transcutaneous skin-muscle flap lower blepharoplasty.8,9 However, because the orbicularis receives dual innervation, it should be thought of as having 2 separate muscle groups, from a functional standpoint. The inner canthal orbicularis is the main muscle responsible for the blinking mechanism and is innervated by the buccal branch of the facial nerve. This branch enters the orbicularis oculi muscle medially and is not disrupted by the traditional blepharoplasty procedure.10 Contraction of the inner canthal orbicularis is also primarily responsible for tone in the lower lid and is exclusively responsible for the pumping mechanism of the lacrimal apparatus (Figure 4).

The extracanthal orbicularis muscle, which generally involves the lateral two-thirds of the arcs of the orbicularis in each eyelid, is independently innervated by zygomatic branches of the facial nerve. Contraction of the extracanthal orbicularis muscle provides expressional animation to the eyelids and plays a role in eye protection (Figure 5). Anatomic and electromyographic studies in postblepharoplasty patients and in people with blepharospasm have confirmed the presence of muscle innervation following transection and resection of the extracanthal orbicularis muscle.5,10,12 Lateral tendon laxity or dehiscence appears to be the cause of FS—not eyelid denervation. Once the integrity of the lateral canthus is achieved by canthal anchoring, correction of the eye closure problem is attained. Patients with eye closure problems after blepharoplasty and undiagnosed lateral canthal dehiscence should not receive skin grafts or gold weights to the upper lid because they will be of little value in improving eyelid

<table>
<thead>
<tr>
<th>Sign/Symptom</th>
<th>Patients, No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry eyes or eye discomfort</td>
<td>36 (100.0)</td>
</tr>
<tr>
<td>Cow lash deformity</td>
<td>32 (88.8)</td>
</tr>
<tr>
<td>Abnormal medial displacement of the lateral canthus</td>
<td>28 (77.7)</td>
</tr>
<tr>
<td>Rounding and/or narrowing of the lateral scleral triangle</td>
<td>24 (66.6)</td>
</tr>
<tr>
<td>Visible eyelid closure deficiency or gapping</td>
<td>24 (66.6)</td>
</tr>
<tr>
<td>Compensatory hypercontraction of the inner canthal orbicularis</td>
<td>20 (55.5)</td>
</tr>
<tr>
<td>Coexisting lower-lid retraction*</td>
<td>21 (58.3)</td>
</tr>
</tbody>
</table>

*An associated finding.

<table>
<thead>
<tr>
<th>Proposed diagnostic criteria for fishmouthing syndrome.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Symptoms of dry eyes or eye discomfort after blepharoplasty</td>
</tr>
<tr>
<td>2. At least 3 of the following clinical findings:</td>
</tr>
<tr>
<td>a. Cow lash deformity</td>
</tr>
<tr>
<td>b. Abnormal medial displacement of the lateral canthus</td>
</tr>
<tr>
<td>c. Rounding and/or narrowing of the lateral scleral triangle</td>
</tr>
<tr>
<td>d. Compensatory hypercontraction of the inner (nasal) orbicularis</td>
</tr>
<tr>
<td>e. Incomplete closure of the eyelids, or eyelid gapping</td>
</tr>
<tr>
<td>3. Improvement in clinical findings after digital repositioning of the lateral canthus</td>
</tr>
</tbody>
</table>
**Figure 4.** Illustration of the inner canthal segment of the orbicularis oculi muscle, which is innervated by the buccal branch of the facial nerve. This functional unit of the eyelid contributes to lower-lid tone in position and is responsible for blinking as well as the function of the tear duct pump. Inset: Greater detail of the muscle portions of the orbicularis and inner canthus, which are innervated by the buccal branch. The size and complexity of the inner canthal orbicularis are apparent.

**Figure 5.** Illustration shows the extracanthal segment of the orbicularis oculi muscle, which is innervated by the zygomatic branch of the facial nerve. With normal blinking, there is usually no activation of this muscle group. Contraction occurs only with facial animation or special protective reactions of the eyelids.
It is important to emphasize that distressed patients who seek a cure for symptoms of dry or irritated eyes should be examined for FS. A surprising number may show telltale signs of this syndrome, such as abnormal medial displacement during blinking, rounding and/or narrowing of the lateral scleral triangle, or cow lash deformity of upper-lid lashes. In the present series, all patients with FS presented with some degree of upper-lid laxity and had their upper-lid tone restored through canthal anchoring of the upper component of the canthal tendon. Correction required drill-hole fixation of the canthal tendon to the lateral orbital rim for effective restoration of lateral canthal integrity in nearly all patients in our series. Selection of the drill-hole technique was based on local tissue condition/scarring from previous surgery and the certainty that the suture was secure enough to hold the tissues in place. Both the upper- and lower-lid components of the lateral canthal tendon were reattached in all 36 patients (Figure 6). The level of canthal reattachment of the lower lid to the lateral orbital rim was determined in relation to eye prominence. When canthal attachments are reinforced, it is important to avoid abnormal supraplacement of the upper-lid tendon, which could weaken upper-lid tone and impair upper-lid closure mechanics. In patients with very prominent eyes, infraplacement of the upper-lid tendon (“crisscross” canthal anchoring) is sometimes required, in addition to tightening or shortening of the upper lid, to achieve the desired upper-lid closure (Figure 7).

In the present study, 58.3% of the patients with FS presented with associated lower-lid retraction and were treated via a transcutaneous skin-muscle flap approach for cheek elevation and lower-lid skin recruitment, plus drill-hole canthal anchoring. Spacer implantation may also be necessary for patients who have lower-lid retraction or prominent eyes. Although we are unable to provide an exact number, a high percentage of our patients, particularly those with prominent eyes and preexisting scleral show, required concomitant spacer implants (porcine acellular dermal matrix [Enduragen; Stryker, Kalamazoo, Michigan]) as part of the corrective procedure (Figure 8). Patching of the lateral canthal tendons with autogenous fascia or acellular dermal matrix may be required to achieve adequate lid support in patients who have undergone multiple previous surgeries (Figure 9).

To achieve optimal correction of FS, factors such as eye prominence, presence of lower-lid retraction, and degree of upper-lid laxity must be taken into account intraoperatively. Each of these factors, which have been described extensively in previous publications, influences the method of correction for canthal dehiscence. Eye prominence (Figure 7) must always be evaluated preoperatively because it will define the level of positioning of canthal anchoring in relation to the pupil at the orbital rim and will determine the need for spacer implantation. Repair of the lateral canthal attachments of the upper and lower lid, together with proper canthal positioning, will alleviate FS symptoms in most patients by improving eyelid closure dynamics while restoring eye fissure shape. Standard canthopexy/canthoplasty or retinacular suspension with periosteal fixation alone may be insufficient to provide effective repair of lateral canthal integrity. Patients who have undergone previous eyelid surgery often have deficient tissue integrity at the lateral rim. All patients in the present series had some degree of scarring at the lateral canthus from previous surgery. Thus,
Figure 7. Illustration shows the correct location of canthal anchoring at the lateral orbital rim with respect to preserving eye fissure shape in relation to eye prominence. Canthal supraplacement can affect and weaken the upper-lid tendon, impeding upper-lid closure by reducing tone and functionality. Inset: Separate infraplacement of the upper-lid lateral canthal tendon may be necessary to preserve upper-lid closure strength and velocity in some patients. This has been termed “crisscross” canthal anchoring and is more commonly used for patients with prominent eyes.

Drill-hole fixation prevailed as the method of choice for achieving the most stable and reliable repair in these cases. Surgeons whose patients have eyelid malpositioning and closure problems after previous surgery are generally interested in a “single-operation cure,” and the predictability of drill-hole canthal fixation (at least in our hands) made it an ideal single-procedure corrective technique.

Figure 8. Spacers can be implanted either transconjunctivally or transcutaneously. This technique is commonly used in patients with prominent eyes when canthal anchoring cannot be supraplaced and elevation of the lower lid is needed.

CONCLUSIONS

Patients who present with eye discomfort and dry eyes after blepharoplasty should be evaluated for fishmouthing syndrome. Fishmouthing syndrome has a broad spectrum of clinical signs, which are best diagnosed through dynamic visualization of the animated tissue during blinking. Video analysis is an essential diagnostic and evaluation tool for such patients, both pre- and postoperatively. The recognition of FS and application of an individualized surgical approach can be effective in relieving the symptoms and in correcting the eyelid deformities.

Disclosures

The authors declared no potential conflicts of interest with respect to the research, authorship, and publication of this article.

Funding

The authors received no financial support for the research, authorship, and publication of this article.

REFERENCES