

Surgical Method of a Corner Mouth Lift

Tae-Kwang Jeong, MD

Background: The mouth and perioral area play a primary role in emotional expression, and these are among the most important areas projecting youth and attractiveness. A downturned corner of the mouth presents negative feelings such as sadness, depression, and tiredness. A corner mouth lift (CML) may restore more attractive and youthful appearance, which can favorably affect first impression, self-esteem, and the quality of life in patients.

Methods: From December 2016 to September 2018, 498 patients underwent a CML. There were 434 women and 64 men. The mean age was 38.99 years (19–63 years) and 34.19 years (21–67 years) in female and male patients, respectively. A total of 432 cases (86.7%) were primary surgical cases, whereas 66 (13.3%) were secondary cases. There were 178 patients (35.7%) who only underwent CML, whereas the remaining patients (64.3%) underwent the CML contemporarily with other perioral surgery such as subnasal lift.

Results: Most patients were satisfied with the results. However, some patients showed unsatisfactory outcomes such as hypertrophic scar, asymmetry, persistent swelling, or undercorrection. The most common complaints immediately after surgery were swelling and bruise, which were improved spontaneously within 1–2 weeks. Postoperative scar and undercorrection were the most common complications that required revision surgery.

Conclusions: CML showed reliable and satisfactory outcomes in most patients. It could be a good option for patients who desire CML regardless of their age. (*Plast Reconstr Surg Glob Open* 2020;8:e2653; doi: [10.1097/GOX.0000000000002653](https://doi.org/10.1097/GOX.0000000000002653); Published online 26 February 2020.)

INTRODUCTION

Esthetic surgeries and procedures have been developing rapidly in response to the increasing interests in physical appearance.^{1,2} The mouth and perioral area play a primary role in emotional expression and are among the most important areas projecting youth and attractiveness. The lips send messages regarding age, sex, health, and degree of interest in another person.³ An upturned corner of the mouth is regarded as looking bright, optimistic, and friendly, whereas a downturned corner of the mouth not only presents negative feelings such as sadness, depression, and tiredness but also adds years to the patient's age. Nevertheless, a downturned corner of the mouth is often overlooked in facial esthetics and rejuvenation. Ignoring this area could make a disharmony, leaving the face looking unnatural. Lifting of the corner of the mouth may restore a more attractive and youthful appearance, which

can favorably affect first impression, self-esteem, and quality of life in patients.

Many authors have presented methods to reverse a downturned corner of the mouth in perioral rejuvenation. However, the useful technique applicable to patients of all ages has not been established yet. Thus, the author aimed to introduce a useful method of lifting the corner of the mouth effectively and to investigate whether this method is suitable even in young patients.

PATIENTS AND METHODS

From December 2016 to September 2018, 498 patients (434 women and 64 men) who desired long-lasting results underwent a corner mouth lift (CML). All patients were East Asians from Korea, China, and Japan. The mean age was 38.99 years (19–63 years) and 34.19 years (21–67 years) in female and male patients, respectively (Table 1). A total of 432 cases (86.7%) were primary surgical cases, whereas 66 (13.3%) were secondary cases. There were 178 patients (35.7%) who only underwent the CML, whereas the remaining patients (64.3%) underwent the CML

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Table 1. Patient Distribution by Age Group

Age, y	Female, n (%)	Male, n (%)	Total, n (%)
10–19	2 (0.5)	0	2 (0.4)
20–29	108 (24.9)	30 (46.9)	138 (27.7)
30–39	142 (32.7)	15 (23.4)	157 (31.5)
40–49	96 (22.1)	10 (15.6)	106 (21.3)
50–59	72 (16.6)	8 (12.5)	80 (16.1)
≥60	14 (3.2)	1 (1.6)	15 (3.0)
Total	434	64	498

contemporarily with subnasal lift, lip augmentation, tubercle surgery, lip reduction, or philtra surgery. All included patients underwent a CML with pure esthetic purpose. Those who underwent a CML to reconstruct deformities, resulting from burn, trauma, and facial palsy, were excluded in this study. Informed consent was obtained from each patient, and the study was performed in accordance with the ethical standards of the Declaration of Helsinki.

PREOPERATIVE DESIGN

In the supine position, the subnasale, labiale superius, and cheilion are marked on the patient’s face. First, point A is drawn at a slightly higher position than the position of the corner of the mouth that the patient wanted in the preoperative consultation. Clinically, the position of point A should be designed to be approximately 30% higher than the preferred position of the patient. A line is drawn

from the cheilion along the vermilion border of the upper lip (line a). Then, a line extending from the vermilion border of the lower lips to point A, passing through the cheilion, is made (line b). A line extending laterally from line a along the natural crease is drawn (line c). When the natural crease is unclear, a wrinkle line that appears when the skin lateral to the corner of the mouth is pinched with the thumb and index finger is used. Point B is created on line a. Usually, the distance between the cheilion and point B is 2-fold of the distance from the cheilion to point A. Point C is drawn on line c at a distance similar to that from the cheilion to point B. Next, a line connecting point A with point C (line d) is drawn. Finally, an inferiorly convex line connecting point A and point B is designed (line e) (Fig. 1).

By measuring the distance from the subnasale to point A and from the labiale superius to point A, point A’ is determined on the contralateral side.

METHODS

A 2% lidocaine solution mixed with 1:100,000 epinephrine is injected into the surgical site. Ten minutes later, the skin is incised along the incision line with a no. 15 blade. Skin and subcutaneous tissues are excised. Then, a small amount of the orbicularis oris muscle is excised. The subcutaneous area inferior to line d is dissected with electrocautery to identify the fibers of the depressor anguli oris (DAO) muscle. While pulling the modiolar origin of

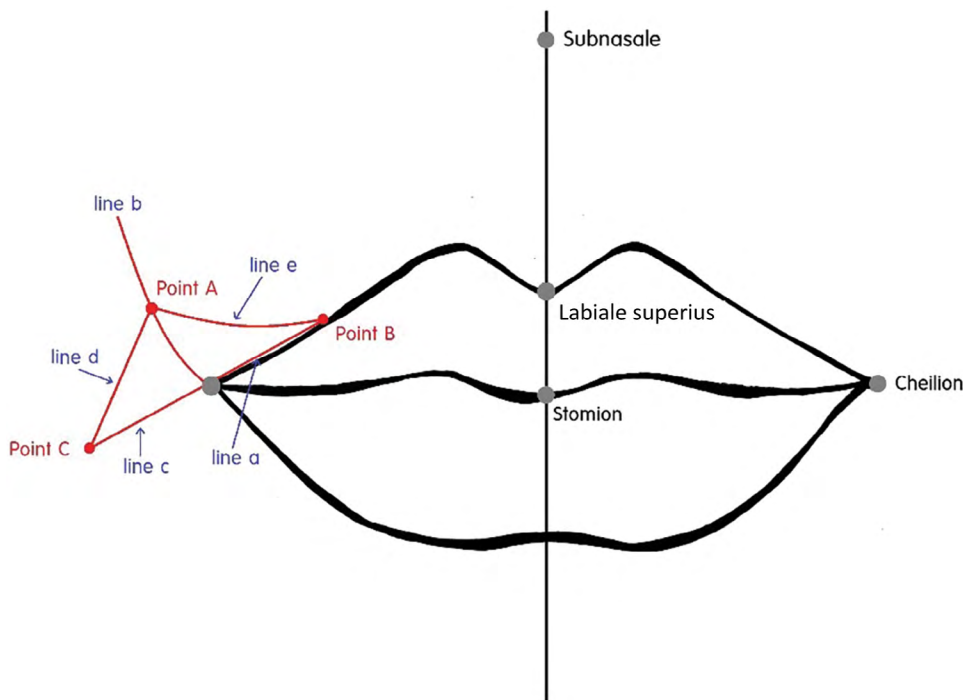


Fig. 1. A schematic illustration of the preoperative design. First, point A is determined at a slightly higher position than the position of the corner of the mouth that the patient wanted. Line a is drawn along the vermilion border of the upper lip from the cheilion. Line b is an extending line from the vermilion border of the lower lip to point A, passing through the cheilion. Line c means the lateral extension of line a. Points B and C are determined on lines a and c, respectively. Line d that connects points A and C is drawn. Finally, a line connecting points A and B is drawn (line e).

the DAO in superior direction, the DAO muscle belly is incised at the upper one-third point of the muscle with electrocautery. The proximal stump of the cut DAO is excised partially (See [Video 1 \[online\]](#)), which displays subcutaneous dissection. Then, the DAO muscle is incised at the upper one-third point of the muscle and the proximal stump of the cut DAO is excised partially. DAO, depressor anguli oris).

If the corner of the mouth is pulled to point A without strong resistance, then perform a key suture connecting the cheilion to point A using a 5-0 resorbable suture (Surgifit 5-0; Ailee Co., Ltd., Busan, South Korea). Subdermal sutures are performed using a 6-0 absorbable suture (Surgifit 6-0; Ailee Co., Ltd., Busan, South Korea), and skin closure is followed using a nylon suture (Blue Nylon 7-0; Ailee Co., Ltd., Busan, South Korea) ([Fig. 2](#)).

The Steri-Strip (3M Health Care, St Paul, Minn.) is attached to the wound to reduce the tension of the surgical site. Dressing change was done at postoperative day 1 and stitched off at postoperative day 5. The Steri-Strip was changed daily, and the taping was maintained for 2 weeks postoperatively. Oral medication containing acyclovir was prescribed for 5 days. Postoperative follow-up evaluations were conducted at 1, 3, and 6 months postoperatively ([Fig. 3](#)).

RESULTS

Most patients were satisfied with the results ([Fig. 4](#)). However, some patients showed unsatisfactory outcomes which required long recovery time or revision surgery. Common complaints immediately after surgery were swelling and bruising, which improved spontaneously within 1–2 weeks. Postoperative scar and undercorrection were

the most common complications that required revision surgery. Asymmetry, herpes reactivation, and persistent swelling were also observed ([Table 2](#)).

Most patients presenting postoperative hypertrophic scars were younger than 40 years old (22/23). Despite the various scar treatment methods, their scars did not show a significant improvement; thus, 17 out of the 23 patients eventually required revision surgery.

In 3 cases, depression scars along the incision line made lateral to the corner of the mouth were observed, and they improved with subcision using an 18-G needle and platelet-rich plasma injection. Four patients with herpes reactivation were treated with an additional 600 mg of acyclovir (3 times daily) for 1 week. Wound dehiscence was treated with resuturing and simple dressing. Persistent swelling spontaneously improved within 2 months after surgery. Allergic reactions subsided by removing the Steri-Strip tape and taking oral medication, including antihistamine and low-dose steroid for 3 days. The asymmetry that persisted until 1 month postoperatively did not improve spontaneously and was managed with revision surgery at 6 months postoperatively. All revision surgeries were performed in 27 cases, due to hypertrophic scar in 17 cases, undercorrection in 6 cases, and asymmetry in 4 cases.

DISCUSSION

Using a neoclassical canon, the face can be divided into horizontal thirds, and the perioral area belongs to the lower one-third, indicating the area from the subnasale to the menton.⁴ The lips are located at the center of the lower one-third and play a significant role in facial expression and esthetics.³

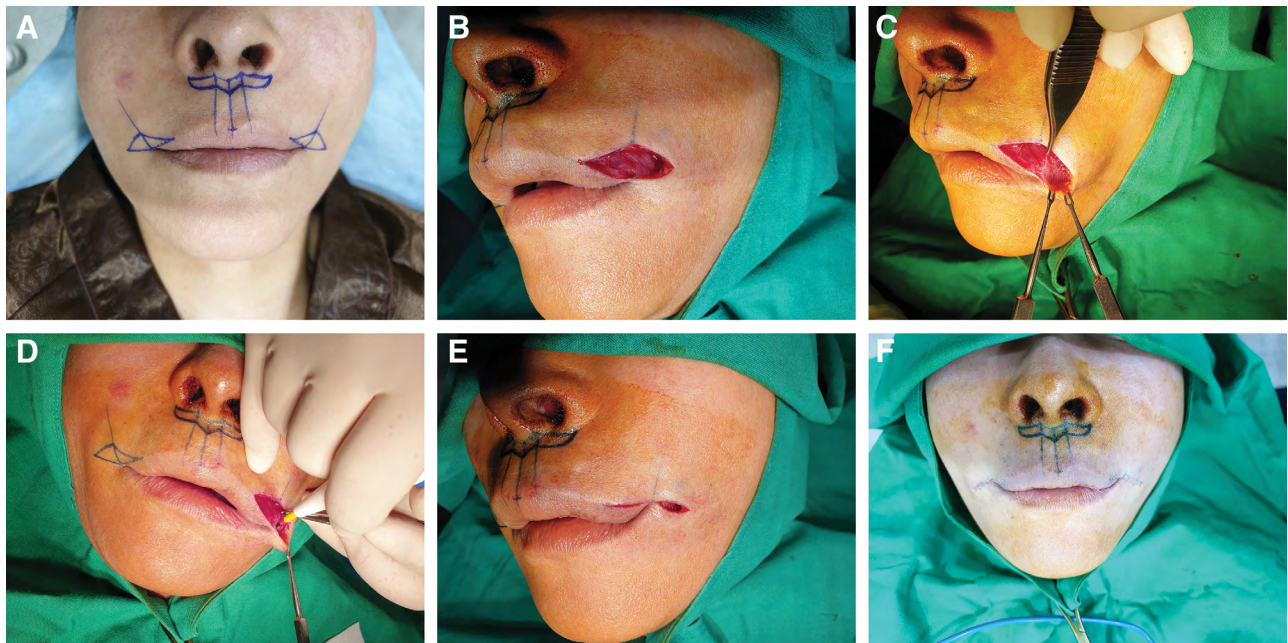


Fig. 2. Intraoperative photographs. A, Preoperative design. B, Skin and subcutaneous tissue are excised. C, Subcutaneous area inferior to line d is dissected. D, The DAO muscle is incised and resected partially with electrocautery. E, A key suture connecting the cheilion and point A is performed. F, Immediate postoperative result is shown. DAO indicates depressor anguli oris.

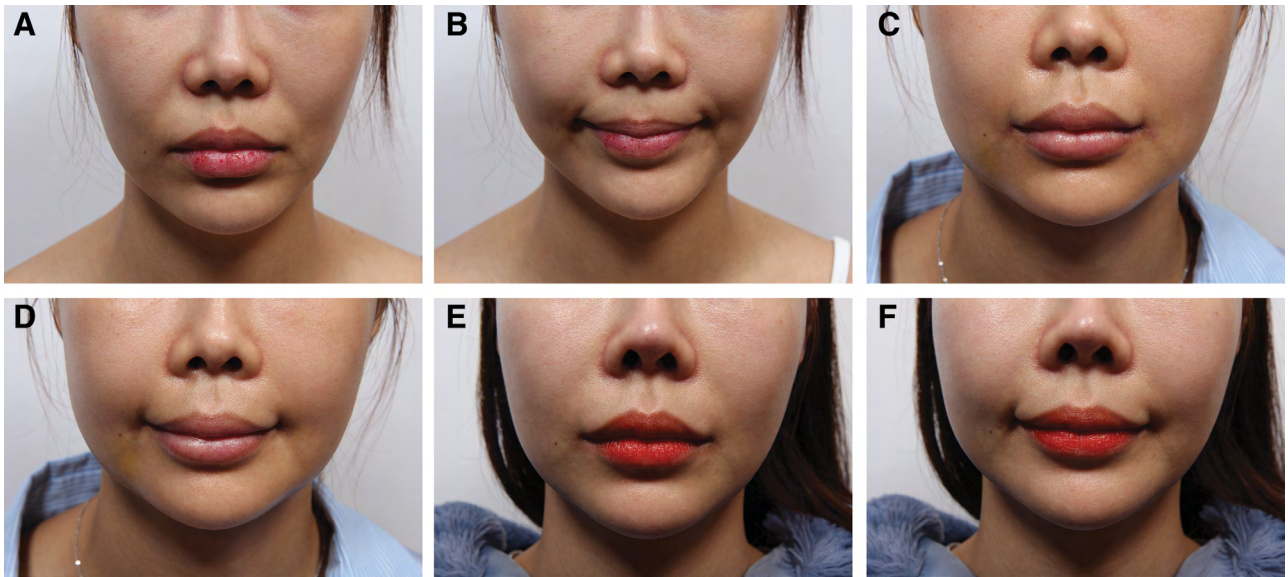


Fig. 3. A 27-year-old female patient. From top to bottom: preoperatively, 1 month postoperatively, and 8 months postoperatively (A, C, E: at repose, B, D, F: smiling).

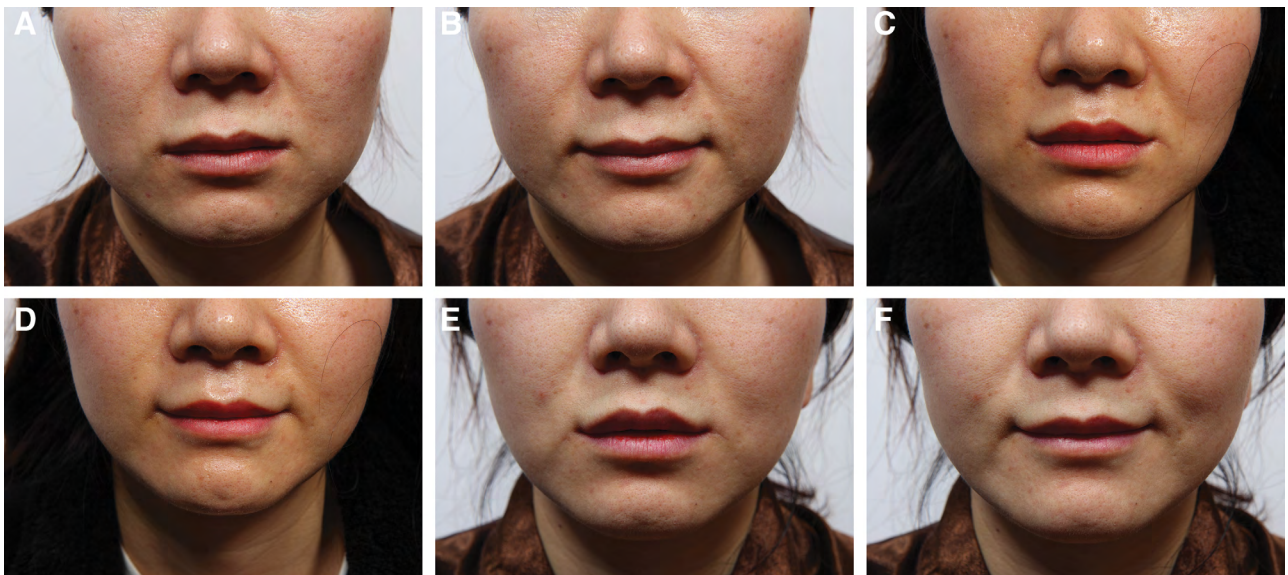


Fig. 4. A 39-year-old female patient. From top to bottom: preoperatively, 3 months postoperatively, and 7 months postoperatively (A, C, E: at repose, B, D, F: smiling).

There are anthropometric measurements that are accepted widely and regarded as the ideal and esthetic

lips. The lips should meet on occlusion and a 2- to 3-mm interlabial gap can be present on repose. On the profile view, the upper lip should extend 2–3mm anterior to the lower lip. The lower lip has a fuller vermilion than the upper lip. The vermilion is separated from the cutaneous lip by the white roll superiorly and from the mucosa by the wet–dry line inferiorly. The oral commissure should lie medially to a vertical line from the medial limbus.⁵ These measurements are not an absolute principle but rather a reference guideline.

It is fundamental to understand the anatomy of the perioral region when attempting a perioral surgery such as the CML. The corner of the mouth has distinct anatomic

Table 2. Complications of the Corner Mouth Lift

Complications	N (%)
Hypertrophic scar	23 (4.6)
Depressed scar	3 (0.6)
Asymmetry	4 (0.8)
Wound dehiscence	1 (0.2)
Herpes reactivation	4 (0.8)
Persistent swelling*	3 (0.6)
Allergic reaction	1 (0.2)
Undercorrection	16 (3.2)

*Swelling lasting for >3 weeks.

characteristics that made it unique. It is composed of skin, mucous membrane, subcutaneous tissue, and muscles. A number of muscles converge toward the modiolus which is an area just lateral to the corner of the mouth. These muscles lie in different planes and play a significant role in facial expression in the perioral region.^{6,7} The corner of the mouth is controlled mainly by the modiolar movement, which is a balance of forces exerted by the muscles attached to the modiolus. The elevation of the corner of the mouth is controlled by 2 main elevator muscles: zygomaticus major (ZM) and levator anguli oris (LAO). Contrarily, the depression of the corner of the mouth is controlled by 2 main depressor muscles, DAO, and platysma.⁸

In the modiolus, the ZM muscle fibers are blended and interlaced with the LAO muscle fibers. The ZM muscle pulls the corner of the mouth in a superolateral and posterior direction, and the LAO muscle alters the overall vector into a more superior direction.^{8,9} The DAO muscle, a main depressor of the corner of the mouth, is a flat triangular muscle and its fibers travel obliquely from the mandible to the modiolus and skin of the corner of the mouth. Its hyperfunction leads to a drooping of the corner of the mouth even in young age. When the contraction force of the DAO muscle is greater than that of the antagonistic levators, such as ZM and LAO, the corner of the mouth will seem descended.¹⁰

Aging in the perioral area has a major impact on the emotional expression and facial esthetics.¹¹ Insight into the perioral aging process is a key for the plastic surgeon to provide comprehensive treatments that fit the patient's need.

It is true that all tissues in the face undergo the aging process, although the debate about facial sagging (volume redistribution) versus facial deflation (volume loss) as a cause of aging change in the face is still ongoing.^{12,13} As a person ages, bone resorption causes the flattening of the maxillary arch and results in posterior displacement of the nasal base and upper lip. This change leaves a redundancy in the soft tissue envelope of the perioral complex.¹⁴ Skin and soft tissue in the lips also undergo aging process microscopically and grossly. The senile upper lip reveals the histologic alteration which includes a decrease in the thickness of cutis and subcutis, an increase in the subcutaneous tissues with the accumulation of adipose cell, the loss of elastin and collagen fibers, and the atrophy of orbicularis oris muscle.¹⁵ Those changes make the lips losing its fullness and definition. Consequently, the aging upper lip reveals vertical lengthening, vermilion thinning, surface flattening, and downturned corner of the mouth.^{11,12} Especially, a downturned corner of the mouth conveys negative feelings, such as depression and sadness, and contributes to the unesthetic facial appearance.

A variety of approaches for the descended corner of the mouth have been suggested. These approaches can be divided into the following 2 categories: nonsurgical and surgical. The representative nonsurgical methods are botulinum toxin type A (BoNTA) injection and injectable filler use. BoNTA can restrict the release of acetylcholine from the presynaptic membranes at the motor nerve ending. It results in flaccid paralysis in an affected muscle by

blocking muscle contraction.¹⁶ The DAO is a target muscle to lift the corner of the mouth with BoNTA.^{10,17} Given that the DAO lies in the superficial plane, the injection of BoNTA should be done superficially to allow the selective paralysis of the DAO and to avoid the unwanted paralysis of deeper muscles. Usually, the injection site is located at 8–15 mm below the corner of the mouth and the injection dose is 2–4 IU/site. According to the severity of the descended corner of the mouth and the practitioner's experience, 1–3 injection sites are used.¹⁰ Its effect lasts for few months.

The hyaluronic acid (HA) filler is used most commonly to correct the volume deflation and wrinkles in the esthetic fields.² For a descended corner of the mouth, HA filler is injected into the inferolateral area to the corner of the mouth. Additional HA could be used to soften the marionette line and prejowl sulcus.^{4,17–19}

However, BoNTA injection for a lifting of the corner of the mouth can be performed only in selective patients and the filler injection often fails to provide an upturned look in the descended corner of the mouth.

A few surgical approaches with different designs and excision methods have been presented to correct the descended corner of the mouth²⁰ because the traditional facelift techniques fall short in lifting the corner of the mouth. Weston et al²¹ presented the direct excision method, which is a simple and effective solution for a descended corner of the mouth. They have performed >1500 CMLs for over 23 years and have shown excellent results with rare complications. Vidal et al²² introduced the modified anguloplasty, which adopted 2 superimposed triangles sharing the basal line. Le Louarn et al²³ adopted the 4-stage strategy that includes BoNTA injection, HA filler use, autologous fat transfer, and the DAO resection according to the severity of the descended corner of the mouth. Parsa et al²⁴ classified the descended corner of the mouth into 2 types and reported the lentiform excision technique with good results. Perkins²⁵ introduced the effectiveness of the rhomboid excision to correct the descended corner of the mouth. These articles mainly focused on the descended corner of the mouth in old age. Studies about the surgeries to overcome the downturned corner of the mouth in young age are still lacking because the authors may be reluctant to perform the surgery in younger patients due to a fear of resultant scar.

A method described here uses the approach of releasing DAO through a wide dissection and the curved line to lift the corner of the mouth. The DAO is a main depressor of the corner of the mouth, and the contraction force acts into the opposite direction to the vector of the CML. The author believes that the DAO resection should be performed during CML because the DAO may play an important role in the unsatisfactory outcomes, such as undercorrection, hypertrophic scar, and late relapse, that may occur after CML. In the author's experience, the incidence of hypertrophic scar after CML surgery was approximately 12.5% before the author adopted the DAO manipulation method in 2016. After adopting the DAO release during CML surgery, the incidence of hypertrophic scar decreased to approximately 4.6%.

The muscle fibers of the pars marginalis of the orbicularis oris travel inward and downward along the red lip margin toward the oral cavity from the upper labial tubercle to the corner of the mouth and integrate with the fibers of buccinator. This feature may explain why the oral commissure curls inward into the oral cavity.²⁶ Given these features, line a becomes a curve with an inferior and posterior direction rather than a straight line. Line a is actually longer than the straight line between the cheilion and point B, which causes length discrepancy with line e, if line e is drawn straight between point A and point B. This length discrepancy could result in dog ear or pleating during wound closure. Using the inferiorly convex line e could prevent problems caused by length discrepancy and smoothly connects the incision line with the nonsurgical vermilion cutaneous junction at point B because it draws a gradual slope from point B to point A. If necessary, the amount of vermilion exposure of the upper lateral lip can be modified by changing the length and slope of line e.

As with other surgeries, consultation with the patient is very important in the CML surgery. Before surgery, surgeons have to evaluate the condition of the patient's perioral region, including labial volume, mouth width, Cupid's bow, white roll, corner of the mouth position, and so on. Especially, it is important to check the asymmetry at repose and smile, and this should be explained to the patient, because the asymmetry is often unnoticed by the patient even when it is obvious.²⁷ Furthermore, by understanding whether the patient expectation is within the acceptable range or not, it is possible to avoid complaints and complications that may arise after the surgery.

The most common complication following this surgery is the noticeable scar at the corner of the mouth. The author used meticulous wound closure, postoperative taping using the Steri-Strip for 2 weeks, scar gel (Contractubex; Merz Pharmaceuticals GmbH, Frankfurt, Germany), and sunblock cream for 6 months to minimize postoperative scar formation. If the scar condition is still not good at 1 month postoperatively, carbon dioxide fractional laser therapy is performed every 2 weeks. If a hard tissue nodule can be felt at the surgical site, a small amount of triamcinolone is injected. All patients undergoing CML are instructed to avoid wide mouth opening for 1 month postoperatively. Although most patients do not suffer from postoperative scarring by using the above mentioned anticatrical methods, scar revision surgery was still performed in approximately 3.4% of patients.

When the hypertrophic scar is treated with fractional laser, triamcinolone injection, and/or scar gel, elevation of scar tissue is improved with time. However, the scar width did not show a significant difference. Most patients (17/23, 73.9%) showing a hypertrophic scar at follow-up eventually underwent revision surgery. It seems to be related to the skin characteristics susceptible to scarring, such as the skin type of East Asian and younger patients (<40 years).²⁸

The author has introduced a reliable and effective method for CML that can be applied to patients in all ages. Given that the final scar is hidden along the vermilion border and the marionette line, postoperative scarring can be minimized. In addition, longer-lasting results can be expected by releasing the DAO muscle. The author

has performed over 2000 cases of CMLs since 2013 and have achieved consistent and favorable results even when applied to younger East Asian patients.

This study presents an effective method to restore a downturned corner of the mouth; however, it does not provide an appropriate solution for postoperative hypertrophic scars, which can be unresponsive to nonsurgical treatments. A further study focusing on postoperative scars is needed to achieve better outcomes of the CML.

CONCLUSION

A method of a CML has shown reliable and satisfactory outcomes in most patients. It could be a good option for patients who desire a CML.

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