OPEN

Restoration of Complicated Epicanthus

Modified Reverse Skin Redraping With Mini-epicanthoplasty for Rescue in Unsatisfied Epicanthoplasty Patients

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Purpose: We had reported the surgical outcome of reverse skin redraping technique for restoration of previously performed epicanthoplasty. In this study, we introduce a modified reverse skin redraping technique that added mini-epicanthoplasty in patients with unsatisfactory results after epicanthoplasty.

Methods: Three hundred twenty-four patients (288 female and 36 male patients) who had unsatisfactory results with previous epicanthoplasty and that were treated with our modified restoration surgery were included in this study.

Results: The mean preoperative interepicanthal distance was 33.6 mm, and the mean postoperative interepicanthal distance was 36.9 mm; the mean difference in the interepicanthal distance before and after restoration surgery was 3.3 mm. Satisfactory aesthetic results were obtained with improvements in areas of asymmetry, overexposure of the caruncle, and the appearance of the previous scar. Only minor complications developed in 15 patients (4.6%) that were resolved with minor revisions. No severe complications requiring reoperations were noted.

Conclusions: Our modified method involving reverse skin redraping and mini-epicanthoplasty is simple and reproducible and is useful for resolution of unsatisfactory results to obtain a naturally shaped epicanthus.

Key Words: epicanthoplasty, unsatisfactory results, reverse skin redraping, mini-epicanthoplasty, epicanthal restoration, epicanthal reconstruction

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A medial epicanthal fold is a skin crease resulting from the excessive development of the orbicularis oculi muscle and other structures in the medial canthal area.¹ The incidence of medial epicanthal folds is estimated to be more than 50% in the Asian population and approximately 50% to 90% in Korean and Japanese populations.² This condition resembles a skin web that stretches the upper pretarsal skin downward. Moreover, it may occasionally exhibit an aesthetically displeasing appearance and may pose limitations for blepharoplasty.³

Epicanthoplasty has recently been gaining popularity owing to its advantages in the effective removal of the epicanthal fold, while improving appearance, especially in combination with a blepharoplasty technique. With an increase in the use of epicanthoplasty, various unwanted and disastrous complications are frequently being reported, and there is a growing demand to resolve complicated results; however, no definitive restoration technique has been reported.

In a previous report, we described a successful restoration involving reverse skin redraping technique, and we mainly focused on “restoration” itself than aesthetics. In terms of aesthetic criteria, it was known that pointed medial canthal area had the 8 ~ 10 degree of slant that lateral canthus located slightly higher than the medial canthus. However, even with our previous method, we could not fully achieve an appearance of naturally pointed and slanted eyes. Therefore, we considered a modification, aiming at enhancing cosmetic outcomes through the addition of mini-epicanthoplasty.

In the present study, we aimed to demonstrate the usefulness of our modified method for the resolution of unsatisfactory results to obtain a naturally shaped epicanthus.

PATIENTS AND METHODS

A total of 324 patients with complications after previous epicanthoplasty underwent our modified restoration method between January 2010 and September 2014. The major aesthetic complaints of the patients included the presence of a scar, distortion of the shape of the medial canthus, asymmetry, bulging of lower lid fat, and change in appearance due to overexposure of the caruncle, and functional complaints included dry eyes and incomplete eye closure. The mean age of the patients was 27.5 years, and there were 288 female and 36 male patients. The mean time interval between previous surgery and restoration surgery was 7.2 months (range, 3 months to 10 years).

The patients were classified into a mild, moderate, or severe group according to the severity of scar formation, pointed shape of the medial epicanthus, amount of skin to be restored, and overexposure of the caruncle (mild [minor scarring or requiring closure of <1.5 mm], moderate [obvious scarring, requiring closure of ≥ 1.5 mm closure, or distortion of canthal shape], and severe [features of moderate scarring, along with incomplete closure, fine wrinkles, lower lid ectropion, scleral show, or functional impairment such as dry eyes]). Additionally, we measured the “interepicanthal distance,” which was defined as the distance between the innermost points of the medial epicanthus. The interepicanthal distance before and 3 months after the restoration surgery was determined, and the difference in the interepicanthal distance was calculated. To assess patients' satisfaction in busy clinical situation, a simple questionnaire survey was administered to the patients at least 3 months after surgery (mean, 6.8 months), which included a 5-point scale for scoring the degree of satisfaction (1, very dissatisfied; 2, somewhat dissatisfied; 3, average; 4, somewhat satisfied; 5, very satisfied).

Surgical Technique

All surgeries were performed under local anesthesia with the patients in the supine position and performed usually at least 6 months after previous epicanthoplasty. Surgery started with our previous reverse skin-redraping methods. Briefly, “point A” was marked at the inner medial part, 1 mm from the lacrimal lake (innermost point of the medial canthus). “Point B” was marked 4 mm away and 70° upward from point A. These points were used as the baseline, and an elective line was drawn at the subciliary line. Finally, “point C” was marked 5 to 6 mm

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FIGURE 1. Mark point A at 1 mm medial from the innermost portion of epicanthus, and mark point B at a location 4 mm away and at 70 degrees upward on the upper eyelid (left). Mark point C is at an outer position following the subciliary line. After drawing a continuous line from B-A-C (a black line), an incision is made using a blade (no. 15). Then, submuscular dissection is performed under the slashed red area (right).

away from the lacrimal punctum, along the previously marked subciliary line (Fig. 1). After marking these base points, an elective incision line connecting points A, B, and C was drawn, and local anesthesia was injected. An incision on drawn line was made using a blade (no. 15). Submuscular dissection was then performed under the slashed red area in Figure 1 from the upper eyelid in the direction of the lower lid until sufficient tissue was obtained (Fig. 1). This is a key step in our previous restoration method that can reduce skin tension and allow easy movement of the skin-muscle flap. When pulling a skin to a medial direction with thumb, point A was shifted medially to point A'. After placing points A' and B in a straight line, we performed suturing at points A

and B. At this point, point B' was marked on a line connecting B and A at a distance 2.0 to 2.5 mm from point B which was used for mini-epicanthoplasty (Fig. 2).

Thereafter, the thumb was released, and the pulled flap was shifted back laterally, with the folding point B becoming the new epicanthal fold. The suture line connecting points B and A was located in the invisible inner part of the newly created epicanthal fold.

Then, in our modified method, 2 to 2.5 mm of overcorrection was performed during the “closing” step. Thereafter, at the folding point connecting points B and B', some stitches were removed (Fig. 3). The redraping of skin in this area toward the medial direction (suturing

FIGURE 2. The skin flap was pulled to medial nose and point A was shifted medially (upper column). A shifted point became point A'. Point B' was marked on a line connecting BA with distance of 2.0 to 2.5 mm from point B (lower column).

FIGURE 3. A'B becomes the front side, and BB' becomes inner side of fold. In a connecting line between BB', stitches in red circle area (left pictures) were removed for mini-epicanthoplasty.

B into B' in oblique direction) and closure offered a change of skin vector with making pointed epicanthus (Fig. 4). We called this method "mini-epicanthoplasty."

RESULTS

Among 324 patients, 52 (16%) were included in the mild group, 176 (54%) were included in the moderate group, and 96 (30%) were included in the severe group.

We successfully applied the technique regardless of the type of previous surgery, and the amount of restoration could be adjusted according to severity. The previously performed surgical procedures were skin redraping epicanthoplasty in 265 patients, modified Park Z-epicanthoplasty in 41 patients, and Uchida method in 10 patients; however, the exact procedures could not be determined in 8 patients.

The mean preoperative interepicanthal distance was 33.6 mm (range, 26.5–41.5 mm), and the mean postoperative interepicanthal distance was 36.9 mm (range, 28.1–43.8 mm). The mean difference in the interepicanthal distance before and after restoration surgery was 3.3 mm (range, 1.5–4.5 mm) (Table 1).

The significance of the proposed method is that large amounts of restorations can be performed easily, and good aesthetic results can be obtained, with a naturally shaped epicanthus (Figs. 5–7).

Patients with visible scars showed satisfactory aesthetic results. Sufficient amount of skin from upper and lower eyelids area allowed a large part of the scar to be removed. Furthermore, when the amount of restoration required exceeded 2.0 mm, we could change the double-fold type from an out-fold to an in-out-fold or an in-fold by creating sufficient upper epicanthal skin.

Complications occurred in 15 patients (4.6%), including over-correction in 8 patients, undercorrection in 4, dehiscence owing to a hematoma in 1, and scar widening that had not improved satisfactorily in 2 (Table 2); no severe complications requiring major revisions were noted. The mean satisfaction score after surgery was 4.54 (standard deviation, 0.41; range, 2–5) (Table 3). We experienced 3 patients who were less than satisfied. In the 3 dissatisfied patients (score 1 or 2), undercorrection (2 patients) and scar widening (2 patients) were main complaints.

DISCUSSION

In this paper, we can obtain a superior aesthetic outcome resulting "more naturally pointed medial epicanthus" in complicated cases than our previous method. To our knowledge, there have only been a limited number of articles focused on a restoration technique

FIGURE 4. Method of mini-epicanthoplasty. After removal of stitches between BB' with pulling a skin into medial direction with thumb, B' is sutured into B that could change the horizontal line (performed removal of stitches between B and B', red circle in Fig. 3) to oblique line (red arrow of right picture). It can pull medial epicanthus into medial direction that finally result in "pointed epicanthus" (blue arrow). Dash lines in the right picture are schematic illustration of the wound configuration.

TABLE 1. Preoperative and Postoperative Interepicanthal Distances in Consecutive Patients

	Preoperative	Postoperative	Differences
Minimum (mm)	26.5	28.1	1.5
Maximum (mm)	41.5	43.8	4.5
Mean (mm)	33.6	36.9	3.3

for overcorrected epicanthus, although the need for restoration has been increasing.

Epicanthoplasty is mainly based on the principles of a local flap and involving rearrangement of the adjacent skin. Various operative techniques, such as simple or complex Z-plasty, V-Y plasty, V-W plasty, and skin redraping, have been used for epicanthal fold correction according to the surgeon's preference.^{2,4-9} However, in a patient who has already undergone an epicanthoplasty, it might be impossible to restore an epicanthal fold with just a "reverse" application of the previous procedure with any technique because of scar adhesion. So, it may be key to obtain a thin and pliable tissue, enabling the elevation of a sufficient amount of skin flap for an easy control of the degree of restoration and tension reduction for achieving minimal scarring.

In revisional epicanthoplasty, V-Y advancement is the most frequently applied surgical technique. Simple V-shaped incision around a medial canthus and closure with Y pattern can solve an overcorrected epicanthus. However, the technique is focused on the "restoration itself" and may not consider an aesthetic canthal shape. Although it can be a reproducible technique when mild scarring

TABLE 2. Complications After Our Modified Technique

	No. Patients
Overcorrection	8 (53%)
Undercorrection	4 (27%)
Dehiscence owing to hematoma	1 (7%)
Scar widening	2 (13%)
Total	15 (100%)

has happened, it cannot control complicated cases such as severe scarring and shortage of pliable skin.

In a previous article, Shin et al also reported a restoration technique for overcorrected epicanthal folds, which made an eagle beak-shaped extension at the medial canthal area.¹⁰ After creating a V flap with extension, horizontal V-Y advancement was used to resolve the overcorrected epicanthus. However, because skin on the nasal side is used instead of the eyelid skin, a limited amount of skin is available without tension, and the skin may be thicker as well, which may lead to an unsatisfactory restoration.^{11,12} Moreover, as the skin includes a scar from the previous epicanthoplasty, poor extensibility and downward extension of the scar are observed in many patients. Finally, the method elongates the scar and is limited in the amount of restoration. Hence, although the method from Shin et al may be suitable for mild cases, in moderate to severe cases, satisfactory outcomes may not be achieved, particularly in severe cases involving a wide scar, a moderate exposure of caruncle, and functional impairment, such dry eyes, scleral show, and ectropion.

FIGURE 5. A 28-year-old man presented with overexposure of caruncle and blunt medial canthal shape after epicanthoplasty (left). Three months postoperative results after modified restoration method (right). The caruncle was no longer exposed, and the blunt canthal angle was restored to a sharp and pointed normal appearance. **FIGURE 6.** A 34-year-old woman complicated after epicanthoplasty. Preoperative view—wide and depressed scar with overcorrected epicanthus (left), 6 months postoperative results (right). **FIGURE 7.** A 40-year-old woman presented with distorted epicanthal shape after previous epicanthoplasty. Preoperative results—scar widening and overcorrection (left), 3 months postoperative results.

TABLE 3. Result of Survey About Patient Satisfaction

Questionnaire (Score)	No. Patients
Very satisfied (5)	201 (62%)
Somewhat satisfied (4)	99 (30%)
Average (3)	21 (7%)
Somewhat dissatisfied (2)	3 (1%)
Very dissatisfied (1)	0 (0%)
Total	324 (100%)

We had advocated our previous “reverse skin redraping method” that made possible to achieve a superior result with a simple technique, and we could easily “close” an overcorrected epicanthus with acceptable scars. Although the technique offered satisfactory results, a loss of angulation with a sometimes unnatural look was a weak point that could not be resolved with our previous technique. So, we considered modification by including “mini-epicanthoplasty” for improving aesthetic outcomes. Mini-epicanthoplasty involves “changing of skin vector” in a line connecting BB’ from horizontal to oblique or vertical direction that repositions a slightly overclosed medial canthal skin. The difference with our previous technique is removal of some stitches and attached folding point connecting points B and B’. The changing of skin vector in this area toward an oblique or vertical direction can offer a formation of pointed epicanthus.

The patient satisfaction survey indicated high satisfactory results and low complication rates related to scarring or revision. According to our complication data, most complications were related to controlling the amount of skin correction.

In our modified method, we could retain the advantages of our previous method: 1) the generation of a large flap with minimal tension, 2) reduction of the visibility of the scar by moving the scar to the ciliary margin on the eyelid side, rather than the nasal side, 3) easy control of the amount to be closed, 4) changing the line of the eye fold to the out-to-in pattern when a large amount had to be closed, 5) applicability regardless of the type of previous surgical method or the degree of epicanthus overcorrection, and 6) obtaining superior aesthetic results through modification.

Based on our experience, several points need to be considered. Our method uses the overcorrected skin that three-dimensionally involves the restoration line; therefore, it is necessary to obtain enough skin to remove the scar and perform mini-epicanthoplasty. Additionally, the exact position of the innermost point of the medial epicanthus should be carefully located, and the position should be such that it is

not too far away, vertically, from the horizontal line originating from the lower limbus of the iris. For cases requiring revisional blepharoplasty, the procedure should be delayed for several months because swelling and double-fold traction may lead to skin tension at the medial canthal area, which could result in scar widening and distortion of the epicanthal shape.

CONCLUSIONS

Epicanthoplasty has been a widely performed procedure that improves cosmetic results and patient satisfaction rates. However, there are only few reports of restoration performed for overdone epicanthoplasty. The authors previously reported a new method with reverse skin redraping epicanthoplasty. The modification of that technique allowed satisfactory aesthetic and functional results, and it involved adding mini-epicanthoplasty to the simple restoration technique.

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