

# Lowering of the High Eyelid Crease in Revision Upper Eyelid Surgery

Stephanie M. Young<sup>1</sup> · Yoon-Duck Kim<sup>2</sup> · Jeong Hee Kim<sup>2</sup> · Stephanie S. Lang<sup>3</sup> · Kyung In Woo<sup>2</sup>



Received: 2 August 2018 / Accepted: 9 September 2018 / Published online: 1 October 2018  
© Springer Science+Business Media, LLC, part of Springer Nature and International Society of Aesthetic Plastic Surgery 2018

## Abstract

**Background** High placement of the lid crease is a common complication in upper eyelid surgery. Correction of the high crease by revision surgery is challenging and has not been well-reported.

**Methods** This is a retrospective interventional study of patients who underwent revision eyelid surgery with lowering of the lid crease from 2008 to 2016 at a tertiary institution. Main outcome measures were pretarsal show (PTS) distance, lid crease symmetry, margin reflex distance 1 (MRD1), and lid height symmetry. Lid crease symmetry was graded as symmetrical, mild asymmetry (PTS difference  $\leq 0.5$  mm), moderate asymmetry (PTS difference  $> 0.5$  mm but  $\leq 1$  mm), or obvious asymmetry (PTS difference  $> 1$  mm). Lid height symmetry was graded as symmetrical, mild asymmetry (MRD1 difference  $\leq 1$  mm), moderate asymmetry (MRD1 difference  $> 1$  mm but  $\leq 2$  mm), or obvious asymmetry (MRD1 difference  $> 2$  mm).

**Results** There were a total of 69 patients and 100 eyes. The majority ( $n = 42$ , 60.9%) of patients were females. The mean age was  $38.3 \pm 17.3$  years, and mean follow-up was 16 months. Mean PTS decreased from 3.1 mm pre-surgery to 2.0 mm 2 years post-surgery. The proportion of patients

with moderate or severe lid crease asymmetry decreased from 81.1% pre-surgery to 6.7% 2 years post-surgery. The mean MRD1 difference decreased from 1.54 mm pre-surgery to 0.23 mm 1 year post-surgery. The proportion of patients with moderate or severe lid height asymmetry improved from 64.5% preoperatively to 4.5% 1 year postoperatively.

**Conclusion** Revision eyelid surgery to correct a high crease is a challenging procedure. We present a technique that is effective in correcting the high lid crease, while simultaneously improving the lid height and lid crease symmetry.

**Level of Evidence IV** This journal requires that authors assign a level of evidence to each article. For a full description of these evidence-based medicine ratings, please refer to the Table of Contents or the online Instructions to Authors [www.springer.com/00266](http://www.springer.com/00266).

**Keywords** Blepharoplasty · Eyelid surgery · Revision blepharoplasty · High crease · Oculoplastics

## Introduction

Upper eyelid surgery comprises double eyelid surgery, ageing blepharoplasty, and ptosis surgery. It has both functional and cosmetic indications and is one of the most common procedures performed worldwide [1, 2]. Despite its popularity, 20–30% of patients with previous upper eyelid surgery may require correction for various reasons [3]. Aesthetic standards for eyelids vary across ethnic groups and cultures. In the East Asian context, common complications after any upper eyelid surgery include eyelid asymmetry and too-high placement of the lid crease [4, 5].

✉ Yoon-Duck Kim  
ydkimoph@skku.edu

<sup>1</sup> Department of Ophthalmology, National University Hospital, Singapore, Singapore

<sup>2</sup> Department of Ophthalmology, Samsung Medical Center, Sungkyunkwan University School of Medicine, 50 Ilwondong, Kangnam-ku, Seoul 135-710, Korea

<sup>3</sup> Clinical Audit, Singapore National Eye Centre, Singapore, Singapore

Correction of high eyelid folds among Asians is one of the most challenging procedures for oculoplastic and plastic surgeons and not well-reported. In the few papers describing correction of high creases (amongst other complications) after eyelid surgery in Asians, two studies reported results that were based on four categories (excellent, good, fair, poor) which were subjectively graded by the surgeon [3, 6], while the third study had no specific details of their results [7].

Our purpose was to (1) describe our surgical technique of lowering the high eyelid crease in revision eyelid surgery and (2) analyse the surgical effects of lowering the high eyelid crease by objective preoperative and postoperative measurements.

## Methods

We performed a retrospective interventional non-comparative study from January 2008 to December 2016 in a single tertiary institution. Patients included in the study had unsatisfactory high eyelid creases from previous double eyelid surgery, blepharoplasty, or ptosis repair. Patient characteristics are summarized in Table 1. There was a total of 69 patients and 100 eyes included in our study. Thirty-one (44.9%) patients had bilateral surgery, while 38 (55.1%) had unilateral surgery, of which 15 were right eyes and 23 were left eyes. The majority ( $n = 42$ , 60.9%) of

patients were females, whereas 27 (39.1%) were males. The mean age was  $38.3 \pm 17.3$  years, range 16–75 years. In terms of previous eyelid surgeries before referral to our centre for revision surgery, 32 (46.4%) patients had one previous surgery, 21 (30.4%) had two previous surgeries, 16 (32.2%) had three or more prior surgeries.

They underwent revision eyelid surgery with lowering of the lid crease by a single surgeon (Y-DK). The study was approved by the hospital's Institutional Review Board (IRB) and adhered to the tenets of the Declaration of Helsinki.

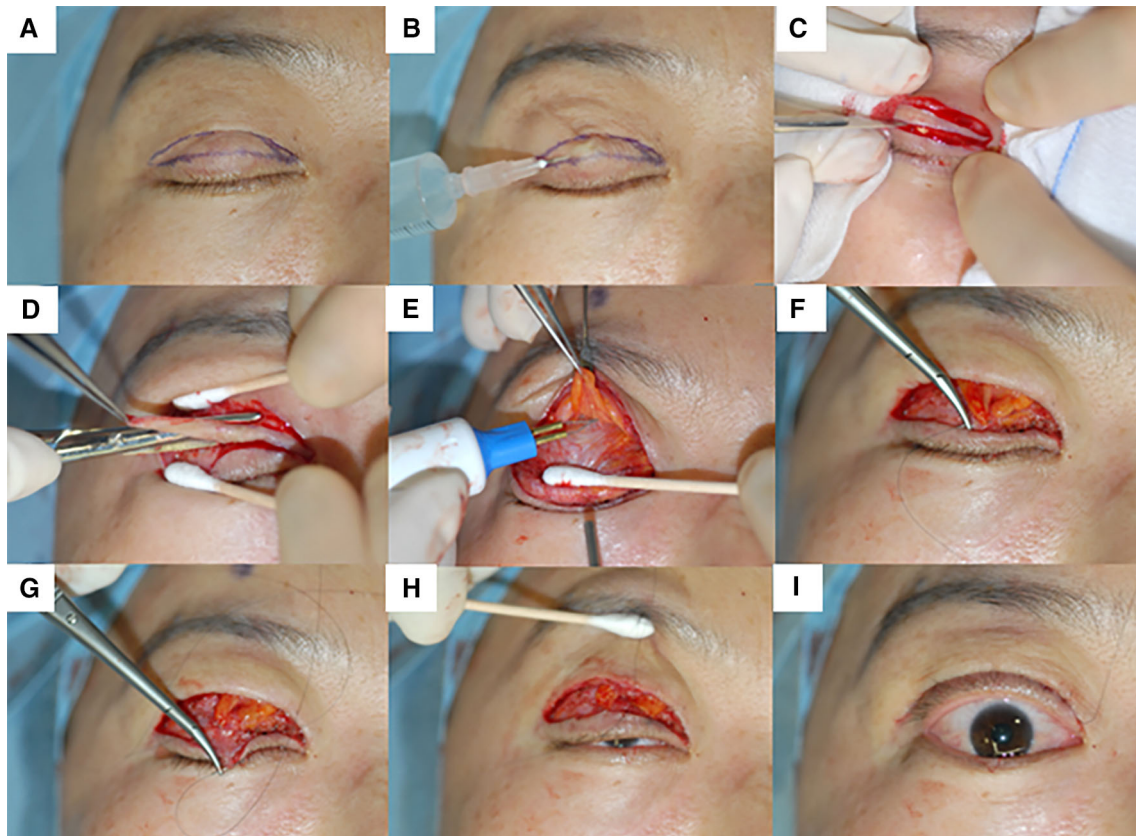
## Surgical Technique (Fig. 1)

The upper border of the skin marking was made at the original high crease, while the lower skin marking was made at the desired new crease position. Local anaesthesia with a mixture of 2% lidocaine with 1:100,000 epinephrine and 0.5% bupivacaine was given. The skin incision was made with a no. 15 Bard-Parker blade, and a small strip of skin, and orbicularis muscle was excised. The skin between the two markings was excised to ensure any scar tissue from the previous incision was removed and to ensure that the new crease formation was at the desired lower marking. If there was insufficient skin due to previous skin removal from prior operation(s), the authors felt it was better not to remove the skin. In such cases, there was a possibility of a visible scar above the new lower crease line.

**Table 1** Patient characteristics ( $n = 69$ )

| Patient characteristics                           |                   |
|---|-------------------|
| <i>Age</i>  |                   |
| Mean  | 38.3 ± 17.3 years |
| Range   | 16–75 years       |
| <i>Gender</i>                                     |                   |
| Male  | 27 (39.1%)        |
| Female  | 42 (60.9%)        |
| <i>Laterality</i>                                 |                   |
| Unilateral  | 38 (55.1%)        |
| Bilateral   | 31 (44.9%)        |
| <i>Previous eyelid surgeries</i>                  |                   |
| One previous surgery                              | 32 (46.4%)        |
| Two previous surgeries                            | 21 (30.4%)        |
| Three or more previous surgeries                  | 16 (32.2%)        |
| <i>Types of previous surgeries<sup>a</sup></i>    |                   |
| Double lid suture surgery                         | 18                |
| Double lid incisional surgery                     | 14                |
| Ageing blepharoplasty with double lid formation   | 46                |
| Ptosis surgery (levator advancement or resection) | 12                |
| Ptosis surgery (frontalis suspension)             | 12                |

<sup>a</sup>Each patient may have had more than one type of surgery at each sitting



**Fig. 1** Surgical technique of revision eyelid surgery with lid crease lowering. The upper border of the skin marking was made at the original high crease, while the lower skin marking was made at the desired new crease position (a). Local anaesthesia with a mixture of 2% lidocaine with 1:100,000 epinephrine and 0.5% bupivacaine was given (b). The incision was made with a no.15 Bard-Parker blade (c), and a small strip of skin and orbicularis muscle was excised (d). The inferior skin and pretarsal orbicularis muscle flap was dissected from the tarsal plate, and some pretarsal orbicularis was excised. The orbital septum was then opened horizontally, and adherent scar tissue was removed with a handheld cautery device. The preaponeurotic fat

The inferior skin and pretarsal orbicularis muscle flap were dissected from the tarsal plate, and some pretarsal orbicularis was excised. The orbital septum was then opened horizontally, and adherent scar tissue was removed with a handheld cautery device. The preaponeurotic fat was separated from the levator aponeurosis, and a free preaponeurotic fat flap that could be fully lowered without tension was created. The fat flap was then lowered to the desired eyelid crease position with buried 7–0 nylon suture that was passed through the upper tarsus and subcutaneous tissue under the skin incision for lid crease formation. Three to four such sutures were placed, followed by three to four skin-orbicularis-tarsus-fat-orbicularis-skin-interrupted sutures. If there was insufficient preaponeurotic fat for advancement, medial fat transposition or a free fat pearl graft was performed to prevent readhesion and avoid multiple creases. Skin closure was then performed with a

continuous 7–0 nylon. The patient was then asked to open the eyes to confirm that the new lid crease was in the desired position (i)

continuous 7–0 nylon. The patient was then asked to open the eyes to confirm that the new lid crease was in the desired position. Prevention of secondary adhesion during the revision surgery was achieved by preaponeurotic fat advancement in 59 patients, medial fat pad transposition in 7, and free fat pearl graft in 3.

### Outcome Measures

Main outcome measures were (1) pretarsal show (PTS) distance, (2) lid crease symmetry, (3) margin reflex distance 1 (MRD1), and (4) lid height symmetry. Outcome measures (3) MRD1 and (4) lid height symmetry were reserved for patients who had concurrent ptosis surgery (levator tuck, advancement or resection) together with the lid crease revision surgery. Lid crease symmetry was graded as symmetrical, mild asymmetry

(PTS difference  $\leq 0.5$  mm), moderate asymmetry (PTS difference  $> 0.5$  mm but  $\leq 1$  mm), or obvious asymmetry (PTS difference  $> 1$  mm). Lid height symmetry was graded as symmetrical, mild asymmetry (MRD1 difference  $\leq 1$  mm), moderate asymmetry (MRD1 difference  $> 1$  mm but  $\leq 2$  mm), or obvious asymmetry (MRD1 difference  $> 2$  mm).

Patient photographs were taken preoperatively and at each postoperative visit. Measurements of MRD1 and PTS were standardized using individual photograph calibration with the 8 mm sticker on each patient's forehead. Any complications related to the procedure were also noted. The Statistical Package for Social Sciences (SPSS) for Windows version 18.0 (SPSS Inc, Chicago, Illinois, USA) was used for data analysis.

## Results

The mean follow-up for patients in our study was 16 months, range 3–60 months. Table 2a shows the decrease in PTS and PTS difference from pre- to post-surgery. The mean PTS decreased significantly from 3.1 mm pre-surgery to 2.0 mm 1 month post-surgery, whereas the mean PTS difference decreased significantly from 1.54 mm pre-surgery to 0.25 mm 1 month post-surgery. Both decrease in mean PTS and PTS differences were maintained during subsequent follow-ups. Figure 2a shows the decreasing trend in PTS difference from preoperative to postoperative follow-up. Figure 3a shows the proportion of patients with symmetry, mild asymmetry, moderate asymmetry, or obvious asymmetry before and after surgery. The majority of patients (81.1%) had moderate or severe asymmetry prior to revision eyelid surgery, but this decreased to 11.5% at 1 month post-surgery, 13.6% at 1 year and 6.7% at 2 years follow-up (Fig. 4). The difference in proportion was significant at all follow-up visits

compared to pre-surgery ( $p < 0.01$ , Wilcoxon signed-rank test).

The mean MRD1 and MRD1 differences pre- and post-surgery for patients ( $n = 62$ ) who had concurrent ptosis surgery (levator tuck, advancement or resection) together with lid crease revision are shown in Table 2b. The mean MRD1 increased from 1.7 mm before surgery to 3.0 mm 1 month after surgery. The increase was significant ( $p < 0.01$ ) and remained so at subsequent follow-up visits. The mean MRD1 difference decreased significantly from 1.73 mm preoperatively to 0.38 mm 1 month postoperatively and remained significant at subsequent follow-ups compared to preoperatively. The decrease in MRD1 difference is demonstrated in Fig. 2b. Figure 3b shows the proportion of patients with lid height symmetry or asymmetry. The proportion of patients with symmetrical lid height or mild asymmetry increased from 35.5% preoperatively to 93.6% and 95.5% at 1 month and 1 year postoperatively.

In terms of postoperative complications, there were six patients with exposure keratopathy, but all improved within 3 months with topical lubricants. Three patients had nasal ptosis, of whom two improved spontaneously whereas one required repeat blepharoplasty 6 months post-surgery. One patient had a faint temporal crease and underwent lid crease revision 1 year postoperatively. Among the patients who underwent concurrent ptosis surgery with lid crease lowering, two had slight (0.5–1 mm) overcorrection whereas one had 1 mm undercorrection in the immediate postoperative period, but all improved spontaneously within 3 months without the need for repeat surgery.

## Discussion

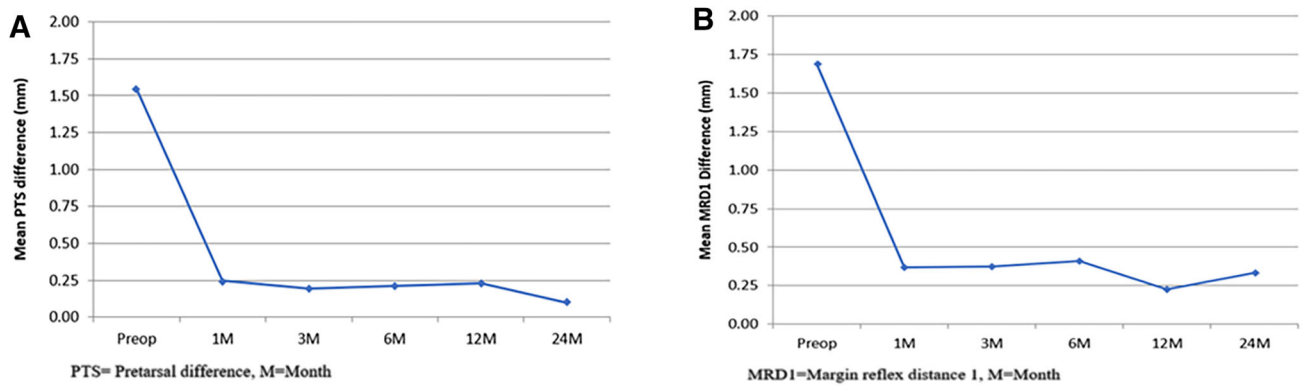
Upper eyelid surgery, comprising double eyelid surgery, ageing blepharoplasty, and ptosis surgery, is commonly performed by plastic surgeons and oculoplastic surgeons

**Table 2** Difference in pretarsal show (PTS) and margin reflex distance 1 (MRD1) pre- and post-surgery

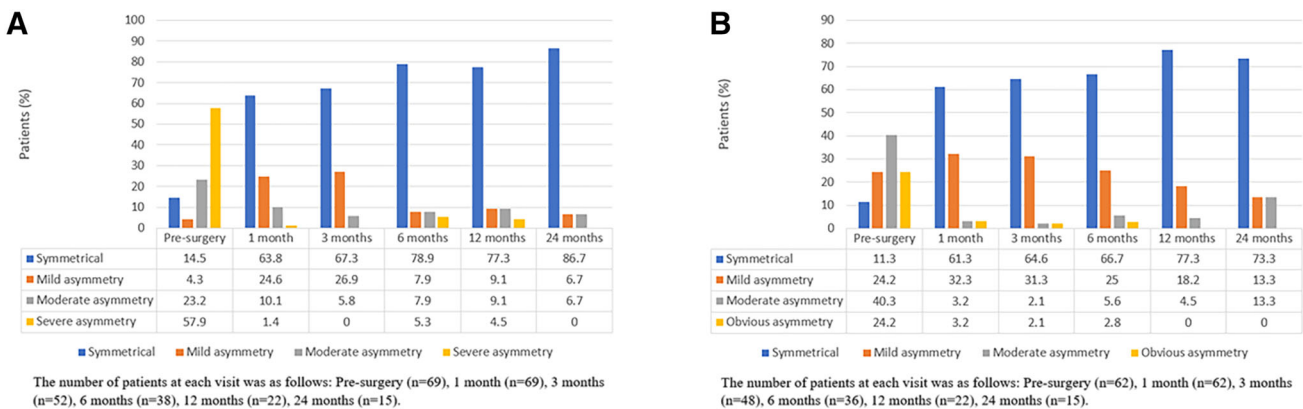
| (a) Pretarsal show (PTS) and PTS difference pre- and post-surgery             |                    |                  |                  |                  |                   |                   |
|---|--------------------|------------------|------------------|------------------|-------------------|-------------------|
|   | Preop ( $n = 69$ ) | 1 M ( $n = 69$ ) | 3 M ( $n = 52$ ) | 6 M ( $n = 38$ ) | 12 M ( $n = 22$ ) | 24 M ( $n = 15$ ) |
| Mean PTS (mm)   | 3.1                | 2.0*             | 1.7*             | 1.8              | 2.0               | 2.0               |
| Mean PTS difference (mm)  | 1.54               | 0.25*            | 0.19*            | 0.21*            | 0.23*             | 0.10*             |
| (b) Margin reflex distance 1 (MRD1) and MRD1 difference pre- and post-surgery |                    |                  |                  |                  |                   |                   |
|   | Preop ( $n = 62$ ) | 1 M ( $n = 62$ ) | 3 M ( $n = 48$ ) | 6 M ( $n = 36$ ) | 12 M ( $n = 22$ ) | 24 M ( $n = 15$ ) |
| Mean MRD1 (mm)  | 1.7                | 3.0*             | 3.1*             | 2.9*             | 3.1*              | 2.9*              |
| Mean MRD1 difference (mm)   | 1.73               | 0.38*            | 0.33*            | 0.39*            | 0.23*             | 0.33*             |

\* $p < 0.01$ , Wilcoxon signed-rank test. M, month; mm, millimetres





**Fig. 2** Pretarsal show (PTS) and margin reflex distance 1 (MRD1) outcomes. Chart showing mean PTS difference from pre-surgery to post-surgery follow-ups (a); Chart showing mean MRD1 difference from pre-surgery to post-surgery follow-ups (b)



**Fig. 3** Lid crease and lid height symmetry. Lid crease symmetry—proportion of patients with symmetry, mild asymmetry, moderate asymmetry or obvious asymmetry (a); Lid height symmetry—

Proportion of patients with symmetry, mild asymmetry, moderate asymmetry or obvious asymmetry (b)

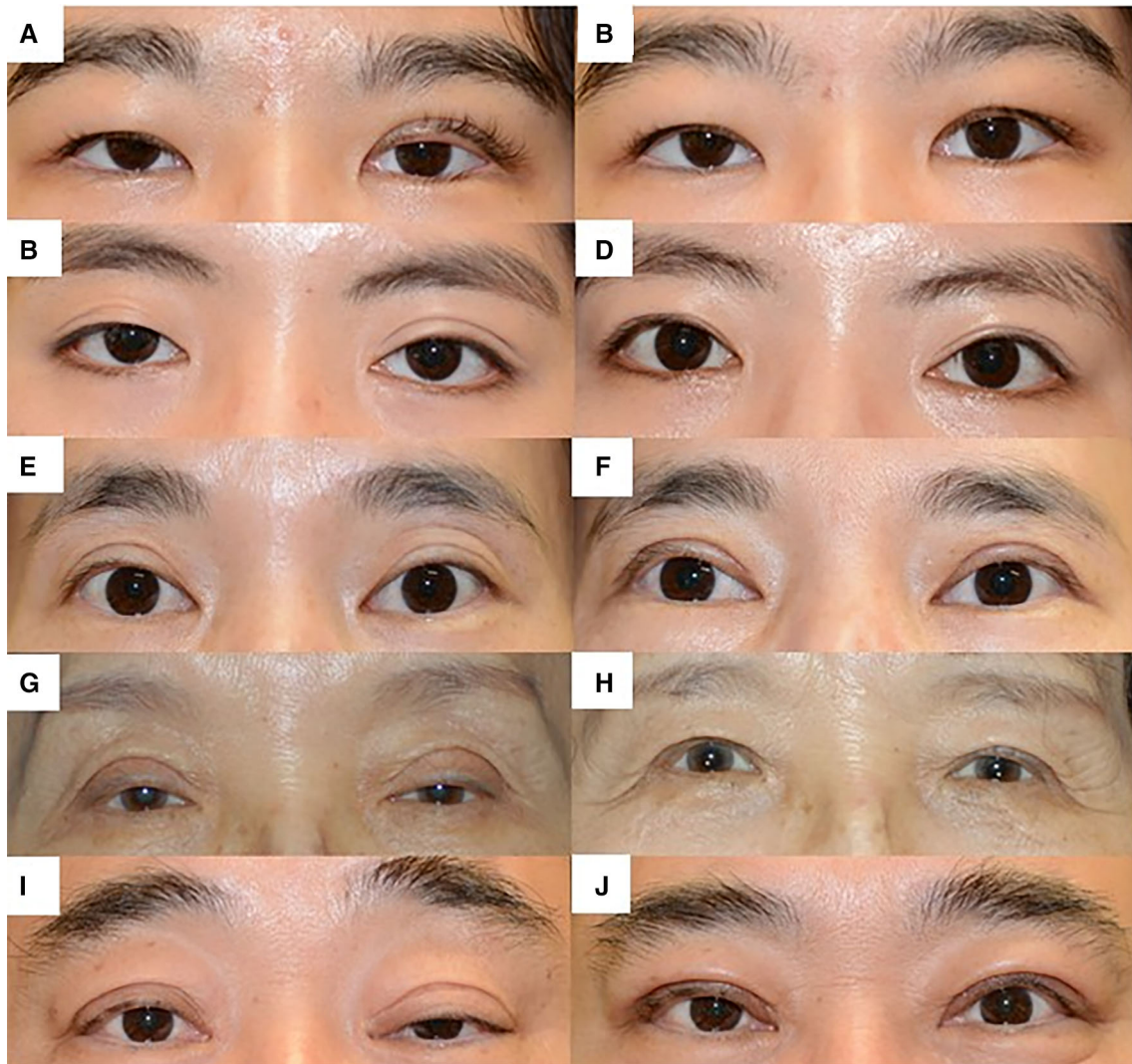
worldwide. However, the incidence of complications is high, and the most common sources of dissatisfaction are postoperative eyelid asymmetry and high placement of the lid fold [4, 5, 7].

Aesthetic standards for eyelids vary across ethnic groups and cultures. The Asian eyelid has its own unique characteristics and if the surgeon does not acknowledge this, aesthetically pleasing results will seldom be achieved [8]. People of Asian ethnic background tend to prefer eyelid creases that are more subtle and closer to the eyelid margin [9]. Although double eyelid formation is currently popular for elective creation or deepening of the supratarsal fold in Asian patients, whether combined with concurrent ptosis surgery or upper blepharoplasty, the result provided may not be the desired outcome in all Asian patients undergoing upper eyelid surgery. Cultural and aesthetic norms dictate that lid creases deemed appropriate in Western eyelids may be too high in the Asian population [9]. In particular, a high eyelid crease is associated with an aggressive or antagonistic personality in many East Asian cultures [10]. High creases are usually accompanied by deep folds, and

patients may complain of an unnatural appearance, a depressed scar, or excessive eversion of eyelashes [4].

Revision surgery for the high lid crease after upper eyelid surgery is challenging for most surgeons, and not widely reported in the literature. In the few papers describing correction of high creases (amongst other complications) after eyelid surgery in Asians, two studies reported results that were based on only four categories (excellent, good, fair, poor) which were subjectively graded by the surgeon [3, 6], whereas the third study had no objective measures for results and only stated they achieved “satisfactory results, evaluating patients by pre-operative and postoperative pictures and by sight” [7].

To our knowledge, our study is the first to provide objective measurements of PTS distance, PTS difference, MRD1 and MRD1 difference for patients undergoing revision surgery for excessively high placement of eyelid creases. We further categorized lid crease symmetry and lid height symmetry based on mean PTS and MRD1 differences, respectively. For all patients undergoing revision eyelid surgery and lid crease lowering in our study, the



**Fig. 4** Patient examples of revision eyelid surgery with lid crease lowering: An 18-year-old female who had undergone two previous eyelid surgeries (frontalis sling operation followed by levator advancement), presented with asymmetrical lid creases and left upper lid marginal ectropion (a). She underwent left revision upper blepharoplasty with lid crease lowering with good correction of the lid margin eversion and achievement of symmetrical bilateral lid creases at 6 months postoperative follow-up (b). A 24-year-old female who had three previous bilateral ptosis surgeries presented with asymmetrical and too-high faint eyelid creases (c). She underwent revision eyelid surgery with lowering of the lid crease with good postoperative symmetry that was maintained at 2 years follow-up (d). A 35-year-old female had a sunken superior sulcus

mean PTS decreased significantly from 3.1 mm pre-surgery to 2.0 mm 2 years post-surgery, resulting in successful lowering of high lid crease. The proportion of patients with moderate or severe lid crease asymmetry decreased from 81.1% pre-surgery to 6.7% 2 years post-surgery. For patients undergoing concurrent ptosis repair, the mean MRD1 difference decreased from 1.54 mm pre-surgery to 0.23 mm 1 year post-surgery, improving the MRD1

with multiple lid creases on the left eye preop (e). She underwent bilateral lowering of the lid crease and fat flap lowering, with additional fat pearl graft to the left upper lid to solve its sunken appearance and double creases (f). A 75-year-old female patient underwent bilateral ptosis surgery 5 years ago and was unhappy with the high lid creases and recurrent left ptosis (g). She underwent bilateral revision blepharoplasty and levator resection with lid crease lowering, with good lid crease and lid height symmetry maintained at 2-years post-revision surgery (h). A 55-year-old male had bilateral ptosis repair more than 30 years ago and presented with obvious asymmetry of his lid crease and lid height (i). He underwent bilateral revision blepharoplasty with levator repair and lid crease lowering with good results at 6 months post-surgery (j)

symmetry in these patients. The proportion of the patients with moderate or severe lid height asymmetry improved from 64.5% preoperatively to 4.5% 1 year postoperatively. The results indicate a procedure that is effective in lowering the high lid crease, while simultaneously improving the lid height and symmetry of the eyelid.

Successful correction of a high crease depends on understanding and addressing the underlying causes, which

include high skin crease design in initial operation, high fixation of the lower flap to a high point, excessive skin excision with insufficient skin to cover the crease, unintended adhesion, blepharoptosis, or a sunken eyelid [4]. In addition, patients usually have had preaponeurotic fat removed as part of their original blepharoplasty, and do not have sufficient fat remaining to prolapse and cause displacement of the fold skin, worsening what some have described as the characteristic “postblepharoplasty look”.

The first and one of the most important steps in correcting the high lid crease is proper marking of the new desired lid crease. High crease design from the initial operation is the most common cause of a high crease. In our technique, the upper skin marking corresponds to the original high fold that is to be rectified while the lower skin marking corresponds to the desired lower crease height. Care must be taken to ensure sufficient skin remains to avoid lagophthalmos postoperatively by avoiding excess excision of skin. If there is insufficient skin, a lower incision can be made without skin resection, followed by undermining of the upper flap and release of the high fold through the preseptal layer.

Careful dissection to release the previous adhesion and scar tissue from the levator aponeurosis is another crucial step in our technique. Aggressive dissection over the levator aponeurosis in the original surgery may result in unintended adhesion of the levator aponeurosis to the skin higher than the desired fold site, which can stretch the pretarsal skin and create an unwanted high fold. Unintended adhesion of the levator to the anterior lamella can also retard the pulling power of the levator resulting in a mild degree of ptosis [11]. Another cause of ptosis is unrecognized levator aponeurosis injury due to unfamiliarity with anatomy and improper dissection. Wattanakrai et al. [6] have found that most high lid folds in their series have a certain degree of ptosis on the affected side.

The preaponeurotic fat advancement flap offers an anatomical barrier to prevent unexpected adhesions between the anterior skin–orbicularis muscle lamella and the levator complex. After resection of scar tissues, the preaponeurotic fat flap is ensured to be free so that it can be redistributed and spread into a thin layer to cover the levator aponeurosis, and pulled down to the new desired lid crease level without tension [7]. The preaponeurotic fat also serves as a volume enhancer between the levator aponeurosis and the anterior lamella, contributing to a more natural contour of the upper eyelids. The above is accomplished with interrupted 7–0 nylon sutures taken through the tarsal plate after crease-forming sutures at a desirable level. In cases with inadequate preaponeurotic fat due to previous overzealous excision, a medial transposition fat pad or free pearl fat grafts may be used to attain the same effect [12, 13]. In some of our patients with previous

blepharoplasty, a prominent medial fat pad is present due to under- or non-resection in the primary surgery, as the medial fat pad is an often overlooked fat pad [14]. In addition, transposition of the medial fat pad can reduce the aged lid appearance caused by a prominent medial fat pad which reduces the depth of the lid concavity medially. Free autogenous “pearl fat” grafts of 5–6 mm in diameter have been described a method of soft tissue augmentation for the eyelid and can be harvested from the subcutaneous submental region, from the abdomen adjacent to an abdominal scar or even from the lower lid in a concurrent lower blepharoplasty [12, 13].

There were a few limitations in our study. Firstly, this was a retrospective study with its inherent biases. There were patients lost to follow-up at later postoperative periods and were excluded from our analysis. Nonetheless, the number of patients in each follow-up was reflected in our results and taken into consideration when performing the statistical analysis. There were no patients lost to follow-up at 1-month follow-up, which we feel is significant as most eyelid surgery results can be assessed at least a month after surgery. Other studies used a subjective grading by surgeons and/or patients to determine if postoperative results were satisfactory [3, 7]. Although we believe subjective grading (especially that of patients) is important, we felt it was important to evaluate the efficacy of our surgical technique with objective measurements without any bias from patients or surgeons.

In conclusion, we have described a surgical technique of lowering the high eyelid crease in revision eyelid surgery that has shown successful outcomes in this challenging group of patients. The crucial steps include correct marking of the new crease position, meticulous dissection of preaponeurotic fat from scar tissue and preaponeurotic fat advancement to the desired crease position. It is effective in significantly reducing mean PTS and improving lid crease symmetry in the majority of patients, as well as reducing mean MRD1 differences and improving lid height symmetry in patients undergoing concurrent ptosis repair.

**Authors Contribution** All authors have made substantial contributions to the (1) conception of the work, (2) the acquisition, analysis or interpretation of data, (3) drafting the work or revising it critically for important intellectual content, and (4) final approval of the version published. All authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The manuscript has been read and approved by all the authors, and the requirements for authorship as stated above have been met.

#### Compliance with Ethical Standards

**Conflict of interest** The authors declare that they have no conflict of interest.

## References

1. International Society of Aesthetic Plastic Surgery (2015) Global statistics report. <http://www.isaps.org/ns/isaps-global-statistics>. Accessed 4 November 2017
2. Yang P, Ko AC, Kikkawa DO, Korn BS (2017) Upper eyelid blepharoplasty: evaluation, treatment, and complication minimization. *Semin Plast Surg* 31:51–57
3. Chen SH, Mardini S, Chen HC, Chen LM, Cheng MH, Chen YR, Wei FC, Weng CJ (2004) Strategies for a successful corrective Asian blepharoplasty after previously failed revisions. *Plast Reconstr Surg* 114:1270–1279
4. Cho IC (2015) Revision upper blepharoplasty. *Semin Plast Surg* 29:201–208
5. Oestreicher J, Mehta S (2012) Complications of blepharoplasty: prevention and management. *Plast Surg Int* 2012:252368. <https://doi.org/10.1155/2012/252368>
6. Wattanakrai K, Chiemchaisri N, Wattanakrai P (2016) Secondary blepharoplasty: correction of the high fold. *Aesthet Plast Surg* 40:914–920
7. Kim YW, Park HJ, Kim S (2000) Secondary correction of unsatisfactory blepharoplasty: removing multilaminated septal structures and grafting of preaponeurotic fat. *Plast Reconstr Surg* 106:1399–1406
8. Kiranantawat K, Suhk JH, Nguyen AH (2015) The Asian eyelid: relevant anatomy. *Semin Plast Surg* 29:158–164
9. Lee JH, Kim YD, Woo KI, Johnson ON 3rd (2015) Preaponeurotic fat advancement in levator recession for treatment of upper eyelid retraction. *Plast Reconstr Surg* 135:680e–690e
10. Chang SH, Chen WP, Cho IC, Ahn TJ (2014) Comprehensive review of Asian cosmetic upper eyelid oculoplastic surgery: asian blepharoplasty and the like. *Arch Aesthet Plast Surg* 20:129–139
11. Chen WPD (2007) The concept of a glide zone as it relates to upper lid crease, lid fold, and application in upper blepharoplasty. *Plast Reconstr Surg* 119:379–386
12. Ellenbogen R (1986) Free autogenous pearl fat grafts in the face: a preliminary report of a rediscovered technique. *Ann Plast Surg* 16:179–194
13. Shorr N, Christenbury JD, Goldberg RA (1988) Free autogenous “pearl fat” grafts to the eyelids. *Ophthal Plast Reconstr Surg* 4:37–40
14. Ullmann Y, Levi Y, Ben-Izhak O, Har-Shai Y, Peled IJ (1997) The surgical anatomy of the fat in the upper eyelid medial compartment. *Plast Reconstr Surg* 99:658–661