



Asian Upper Blepharoplasty with the Hinge Technique

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Abstract Asian upper blepharoplasty is one of the most commonly requested procedures in Asian patients. Many incisional and suture methods have been described in the literature. While the suture method is advantageous for its simplicity and quick recovery, the incision method is more versatile and able to deliver predictable and reproducible results for Asian patients presenting with a diverse range of anatomy and requests. Accordingly, the incision method remains the preferred approach for many surgeons performing Asian upper blepharoplasty. In this paper, we detail our open incision hinge upper blepharoplasty technique to create dynamic upper eyelid creases in Asian patients. The surgical videos associated with this paper present our surgical technique in detail, highlighting technical refinements and surgical nuances to perform the surgery precisely and predictably. The conceptual core of our approach is the use of a vascularized orbital septum as a flap to create a fibrous extension from the levator aponeurosis to the dermis at the location of eyelid crease. This vascularized flap securely connects the posterior lamella with the anterior lamella to securely form the eyelid crease with eye opening. This most accurately recreates the anatomy that is present in attractive

Asian patients with naturally occurring double eyelid and predictably creates a dynamic and crisp upper eyelid crease. *Level of Evidence V* 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.

Keywords Asian · Oriental · Double eyelid · Upper eyelid · Crease · Cosmetic · Surgery · Incision · Open

Introduction

Asian upper blepharoplasty encompasses a range of procedures designed to improve the aesthetic appearance of the Asian upper eyelid. It is the most frequently requested aesthetic plastic surgery procedure in Asian patients [1–5]. Despite being commonly performed, Asian upper blepharoplasty remains an intricately complex procedure with difficulty in delivering consistent high-quality results. Patients commonly present with an absent upper eyelid crease, often referred to as a ‘single eyelid’ (单眼皮). From such colloquial origins, Asian upper blepharoplasty has since been widely and aptly, termed ‘double eyelid’ (双眼皮) surgery in many East Asian and even Western countries [6, 7]. However, many patients with naturally occurring double eyelid present for Asian blepharoplasty with the aim of refining various aesthetic aspects of their upper eyelid. Therefore, ‘double eyelid’ surgery as practiced today in Asia extends far beyond creating an upper eyelid crease, to delivering various enhancements as demanded by patients today.

A plethora of anthropomorphic studies have classified and re-classified the Asian upper monolid and compared this to the Caucasian upper eyelid. As with any phenotype,

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there are certainly variations. Han et al. described three general morphological types of the Asian upper lid: (1) single eyelids with absent supratarsal creases, (2) rudimentary, low seated inner eyelid creases with nasal tapering, and (3) double eyelids parallel to the lid margin [8–17]. Plastic surgeons seeing patients with these diverse native Asian anatomies would need to achieve definitive crease creation, elevation or enhancement of the upper eyelid crease and maintaining a natural, dynamic supratarsal fold, while avoiding overt “Westernization” of the Asian eye [5, 17–21].

The ideal method for creating or re-establishing a dynamic supratarsal crease in an attractive or youthful Asian upper eyelid is to closely reapproximate the anatomy as physiologically as possible. The *hinge upper blepharoplasty* is an open technique that recreates the natural architecture of the double eyelid. It is an open or incision technique that utilizes the *orbital septum as a vascularized flap to surgically create connections between the levator aponeurosis to the dermis*. This anatomically extends the levator to the dermis as seen in patients with naturally occurring upper eyelid creases [17–22]. Here, we present this technique that has been used and continually refined by the senior author (FCW) over the past 40 years. This VIDEO paper details our surgical technique and long-term results in the Asian upper eye lid.

Anatomical Consideration for Asian Upper Blepharoplasty and the Hinge Technique

Several *key anatomical features* of the Asian upper eyelid and its implications should be reviewed (Please see VIDEO #1) [23, 24]. These include the following three key differences from the Caucasian upper lid: (1) Thickened and hypertrophic orbicularis oculi, (2) multi-lamellar and thickened orbital septum, and (3) lower fusion point, or “conjoint area”, of the levator aponeurosis to the orbital septum at the upper edge of the tarsus [25, 26].

The implications of hypertrophic orbicularis oculi are that constant contractions, and tonicity of the muscle interferes with and attenuates the surgically created connective architecture between the levator aponeurosis and pretarsal dermis required for stable upper lid crease formation [22, 23, 26]. As a result of this anatomy, several authors have specifically described the necessity of excision of the orbicularis oculi to eliminate this interposed soft tissue to optimize crease formation [27–29]. The multi-layered orbital septum confers a robust layer of fibrous soft tissue. It provides strong anchorage points for suture fixation for crease formation and is also very well vascularized [30]. The lower fusion point of the conjoint area, at the level of the upper edge of the tarsus, is also the ideal location for crease formation in the Asian upper lid

[29–32]. Once the orbital septum is opened up completely and hinged caudally on the conjoint area, this orbital septal flap naturally becomes a fibrous anatomical extension of the levator aponeurosis (Fig. 1). Once this orbital septal flap is fixed to the pretarsal dermis, this creates an anatomical and physiological reconstruction of natural “double eyelid” creases in the Asian upper lid [4, 29–36].

Patient Selection

Precise patient selection is critical to achieving predictable and reproducible results. A detailed pre-operative discussion to understand the patients desired aesthetic outcomes was performed. Specifically, an understanding of the desired crease height and pretarsal show was determined. If necessary, upper eyelid contouring by fat excision was also high-lighted to each patient. Critical in the pre-operative assessment is the determination of the presence of blepharoptosis. This was assessed by the margin to reflex distance 1 (MRD1) and *evaluation of compensatory*

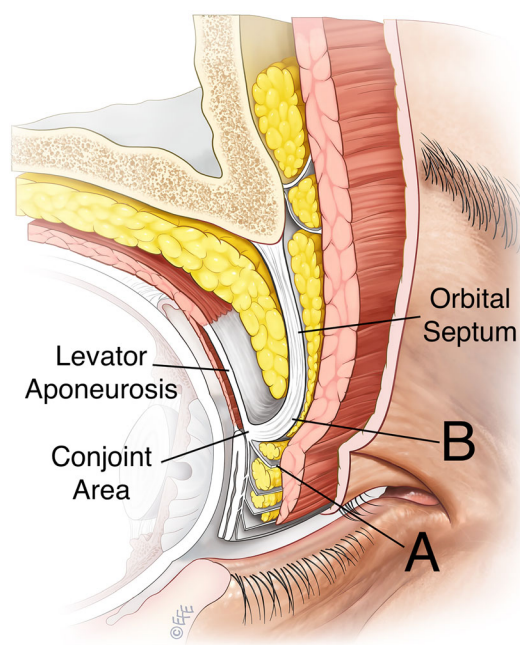


Fig. 1 The anatomy of the Asian upper eyelid is illustrated here. The robust orbital septum prolapses and bulges over the upper edges of the tarsus to fuse with the levator aponeurosis at the *conjoint area* located at approximately the upper edge of the tarsus. (This fusion point is lower than that seen in Caucasian upper eyelids.) In Asian patients with naturally well-formed upper eyelid crease, fibrous extension of the levator aponeurosis also arises from the conjoint area to insert into the dermis (A)—forming a crisp eyelid crease when the levator contracts with eye opening. To surgically recreate this anatomy, cutting the orbital septum at B and using this flap of orbital septum and rotating it into location A would reproduce this fibrous extension of the levator aponeurosis inserting into the dermis at the location of the crease. As the orbital septum flap is hinged on the conjoint area, this technique has been termed the hinge blepharoplasty

frontalis hyperactivity. A MRD1 of 4 mm or greater without frontalis compensation was considered normal. Patients with normal levator function and normal eye opening were considered good candidates for this procedure, while those with mild or subclinical ptosis were excluded. The rationale for this exclusion criteria is that a normal levator function is required for sufficient transmission of lifting power to the crease in order to create a dynamic upper eyelid crease. This is a pre-requisite for good outcomes with the hinge blepharoplasty technique.

Surgical Technique

Pre-operatively, the skin incisions were designed based upon the patient's native crease, if present. In a monolid, crease design is tailored from the patient's desired crease height. As a guide in Asian upper lid, the lower incision is sited at 7.5–9.5 mm from the ciliary margin with the upper eyelid on gentle traction. Skin excision of 0 mm to 8 mm may be performed based on the desired pretarsal show and degree of skin excess.

The procedure is performed under local anaesthesia. Light sedation may also be administered. An anaesthetic mixture of a 10 cc 1% lignocaine, 10 cc 1% Ropivacaine with 0.2 cc 1:1000 adrenaline is used. Infiltration of 1 to 1.5 ml of local anaesthetic is performed to each upper lid. Skin is incised and removed. At one millimetre above the lower skin incision, the orbicularis oculi are incised, and the dissection is continued along the retro orbicularis oculi plane towards the ciliary margin. This elevates the pretarsal orbicularis oculi from the orbital septum and tarsus. A bevelled, trapezoidal excision of the orbicularis oculi is then performed with the iridectomy scissors with gentle cephalad traction of the muscle (Fig. 2) [28, 29]. This trapezoidal excision creates a precise gap in the orbicularis oculi for the orbital septal flap adherence to the dermis [30, 31].

The first step to raising the orbital septal flap is hydrodissection of the retroseptal space with an infiltration of local anaesthetic. This is important to prevent damage to the levator aponeurosis. The infiltration balloons the retroseptal space thereby further separating the levator aponeurosis (located at a deeper plane) from the more superficial orbital septum [29–31]. The safest location to start the initiate the sharp division of the orbital septum is laterally, because the fusion point between the levator and septum is the lowest here. Gentle caudal traction of the levator aponeurosis with cranial counter traction of the orbital septum is paramount to prevention of inadvertent injury to the levator aponeurosis. As mentioned, the fibrous, multi-lamellar nature orbital septum is to be anticipated during dissection. Incising through multiple

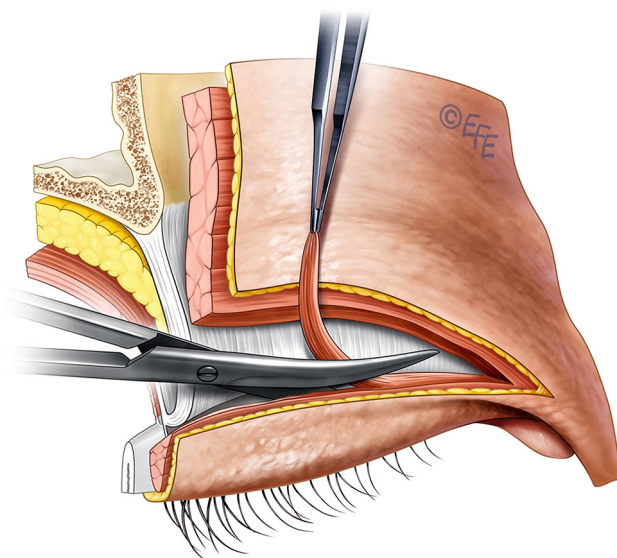


Fig. 2 A trapezoidal strip of orbicularis oculi below the location of the planned upper eyelid crease location is excised. This creates a precise gap in the orbicularis oculi to facilitate the creation of a robust and precise zone of adhesion between the cut edges of the orbital septum posteriorly and dermis anteriorly to create a crisp and long-lasting upper eyelid crease

layers is the norm before reaching the retroseptal space [29–31]. The key landmark that indicates entry into the retroseptal plane (and therefore complete division of the orbital septum) is the discrete orbital fat pads (the lateral extension of the central fat pad) located within the loose areolar retroseptal space [31, 32].

Once entered and the cut edges of the orbital septum defined, the rest of the orbital septum can be incised with certainty, from lateral to medial, across the upper eyelid. The lower edges of the orbital septum are then transposed caudally, creating a thick, robust, and vascularized orbital septal flap as an caudal extension of the levator aponeurosis to create a defined and dynamic upper lid crease (Figs. 3 and 4). The orbital fat pads are excised as indicated. Usually, the lateral extension of the preaponeurotic fat pads is conservatively excised, while the central preaponeurotic fat pads are usually preserved to prevent hollowing of the upper sulcus. Please see VIDEO #2.

Suture fixation of the orbital septal flap to the pretarsal dermis is placed approximately 1 mm above the conjoint area to optimize tension of the flap to the dermis. Using Vicryl 7/0 sutures, the dermis is sutured to lower edge of the orbital septal flap. Eight to ten fixation sutures are placed on each upper eyelid. This creates an optimally firm but not overly tight connection between the levator aponeurosis and the dermis for dynamic eyelid crease formation with eye opening. Reinforcement of the fixation is accomplished with a series of interrupted skin-orbital

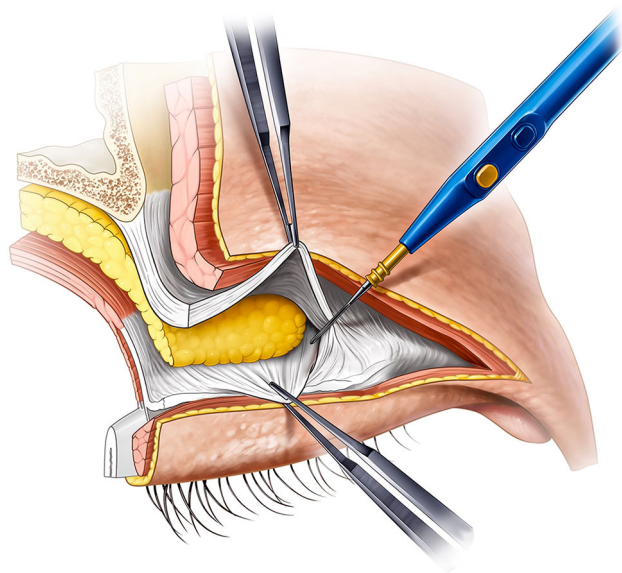


Fig. 3 The orbital septum flap, when rotated caudally, hinging on the conjunct area, will then be functionally converted into fibres extending from the levator aponeurosis to insert into dermis at the location of the intended eyelid crease. This surgically created anatomy is one that most closely reapproximate the anatomy seen in Asian patients with natural double eyelid

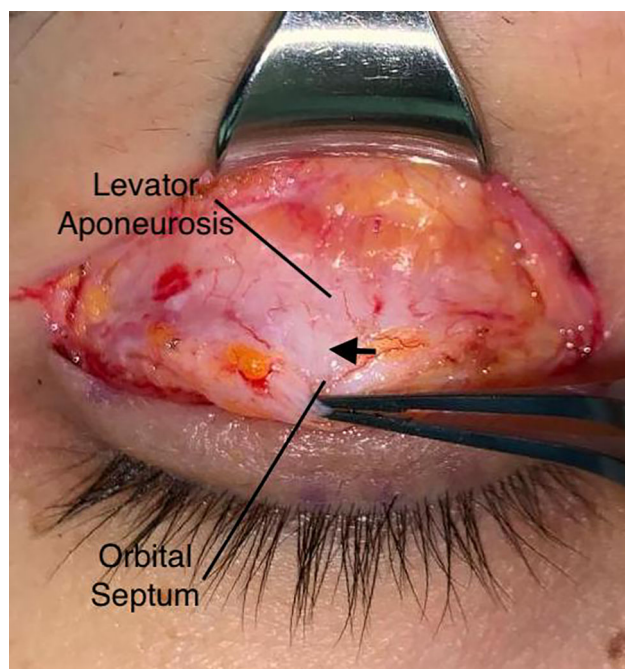


Fig. 4 Intra-operative photo. The forceps is grasping onto the robust cut edge of the orbital septum flap. This when rotated caudally, hinging on the conjunct area (arrow head), the septal flap is now a robust fibrous extension of the levator aponeurosis

septum-skin closure with Ethilon 7/0. The patient is then sat up for a final check on symmetry and crease height. Please see Video #3.

Results

We prospectively analyzed the results in 185 consecutive patients from Jan 2015 to June 2020. One hundred and thirty-eight were female patients, and 47 were male. One hundred and twenty-two (66%) were primary cases, and 63 (34%) were revision cases. The mean age of the patients was 28 years (Range 14–52). The mean operative time for patients undergoing bilateral upper blepharoplasty was 54 min (Range 45–95 min). The mean follow-up was 15 months (Range 4 to 65 months). Medial epicanthoplasty was performed concurrently in 34 patients (18%) and lateral epicanthoplasty in three patients (2%). The majority of patients were pleased with the outcome of their surgery with good stability of their long-term result. There were no major hematomas, wound infections or post-operative lagophthalmos. Our revision rate was 6% (12/185). Of these, a majority (10 patients or 5%) were for asymmetries in the skin crease heights only requiring revision with simple skin excisions only. Two patients (1%) had asymmetries in the palpebral height and loss of the crease. This was related to undiagnosed subclinical eyelid ptosis early in our series and was successfully treated with revision upper blepharoplasty with levator advancement and re-fixation of the crease.

The hinge blepharoplasty is a *versatile* technique that is able to deliver a range of tailored aesthetic outcomes, from subtle (low creases) to more dramatic (higher contoured creases) changes, depending of the patients aesthetic preferences and requests. More subtle and ‘natural’ (lower crease) results are demonstrated in Fig. 5A and B. Patients

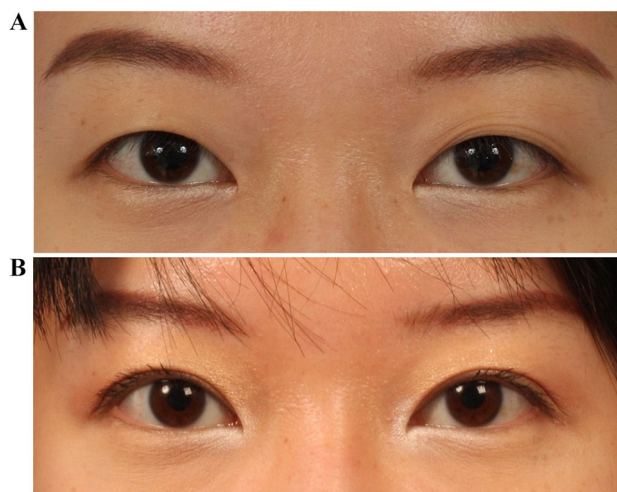


Fig. 5 A and B: A 22-year-old female with absent upper eyelid crease on the right and multiple poorly formed crease on the left. She requested for a very natural and low eyelid crease. The lower incision was fixed 8 mm from the ciliary margins with 2 mm of skin excision. The lateral fat pad was conservatively excised. Here, she is shown at 18 months post-surgery with natural and crisp upper eyelid crease

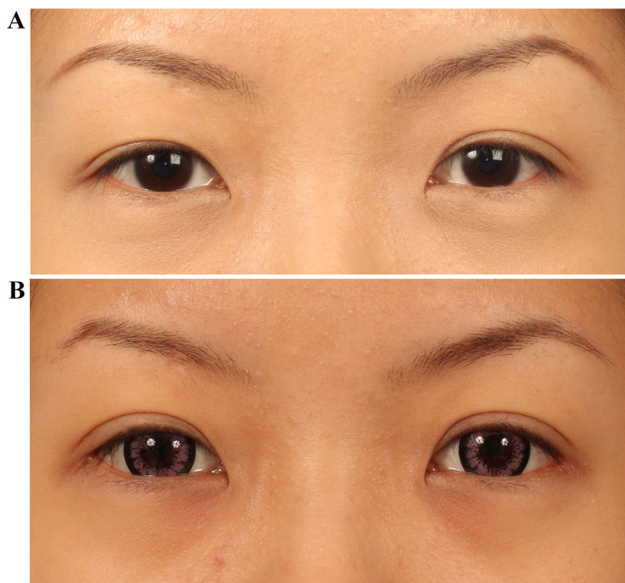


Fig. 6 A and B: A 20-year-old female asymmetric upper eyelid creases. She would like to have a symmetrically higher creases with more pretarsal show. The lower incision was made at 9 mm from the ciliary margins, and 3 mm of skin was excised. No fat was excised. Lateral epicanthoplasty was performed at the same time. Here, she is shown at 1-year post-surgery with symmetrical and higher eyelid creases

requesting for a more glamorized upper eyelid crease with more pretarsal show are shown in Fig. 6A and B. Patients with asymmetry in the upper eyelids may be corrected effectively (Fig. 7A and B). Patients early ageing upper eyelids (Fig. 8A and B) and with more significant dermatochalasis (with no upper eyelid ptosis) (Fig. 9A and B) may be treated with the hinge blepharoplasty technique with good effect.

Discussion

To create a stable upper lid crease, an area of robust attachments between the levator aponeurosis and the dermis is a pre-requisite. Many techniques have been described ranging from suturing the dermis to the lower edge of the levator aponeurosis or to the upper edge of the tarsus [37, 38]. A common criticism with these techniques is that this creates an overly fixed or static upper eyelid crease which is deep and sunken with eyelid closure [39–42]. In the naturally occurring upper eyelid crease, extensions or fibrous slips from the lower edge of the levator aponeurosis pierces through the orbicularis oculi to insert into the dermis of the upper eyelid (Fig. 1) [1–5]. A dynamic supratarsal crease only forms when the supratarsal skin invaginates through the inward pull of these fibrous slips upon activation of the levator with eye opening. On eye



Fig. 7 A and B: A 29-year-old female presented with asymmetric upper eyelid crease with some early skin hooding/excess and puffiness of the upper eyelids. She would like higher eyelid creases with more pretarsal show. The lower incision was made at 9 mm from the ciliary margins and 2 mm skin excision on the right and 4 mm skin excision on the left was performed. The lateral orbital fat pads were excised bilaterally. Here, she is shown at 1-year post-surgery

closure, these slips are relaxed with only a faint upper eyelid crease seen [39, 43–45].

The orbital septum in the Asian eyelid is ideally suited to reconstruct this anatomy. It is thick and robust. When cut and reflected 180° caudally, hinging on the conjoint area, the orbital septum flap becomes a vascularized fibrous extension of the levator aponeurosis (Fig. 4) [4, 33–38]. Fixation of the free cut edge of the orbital septum to the dermis recreates the fibrous slips from the aponeurosis as seen in natural upper lid creases. It is important for the surgeon to create a degree of resting tension of the fixation, but not to overly tight. A degree of ‘laxity’ of the fixation also allows dermal relaxation which translates to a less visible crease and stigmata of upper lid surgery upon eyelid closure. This appropriate tensioning with the hinge blepharoplasty technique creates a dynamic and natural upper eyelid crease that adapts with upper eyelid movements [43–46].

Two further aesthetic considerations should also be discussed in Asian upper blepharoplasty: (1) height of the crease and (2) contouring of the upper eyelid with orbital fat excision. Crease height has a profound effect in delivering a subtle (natural) result or a more stylized outcome. We have noticed that in recent years, many patients are requesting for a more natural result. In these patients, the lower incision is placed lower (generally about 8mm from



Fig. 8 A and B: A 38-year-old female presented with early ageing of her natural double eyelids with asymmetric lowering of the crease and puffiness of her upper eyelid. A hinge upper blepharoplasty was performed. The lower incision was placed at 8 mm from the ciliary margin (her native crease location), 3 mm of skin was excised bilaterally, and the lateral fat pad was conservatively excised. A medial epicanthoplasty was performed at the same time with the skin redraping method. Here, she is shown at 3 years post-op with crisp and symmetrical upper eyelid crease. The eyelid crease looks natural and harmonious with no tell-tale signs of surgery. This gives her eyes a brighter and more engaging appearance. Note the subtle but quite significant enhancement of the upper eyelid aesthetics in accordance with the patient's requests. This highlights the versatility and longevity of the results achieved with the open technique in general and specifically with the hinge blepharoplasty technique

the ciliary margin) and less skin is excised (2–3 mm in general) (Fig. 5A and B). A significant proportion of patients prefers a more stylized or glamorous result with greater pretarsal show. In these patients, the lower incision is placed higher (9–9.5mm), and more skin was excised (4–5mm in general) (Figs. 6 and 7). Fat excision for contouring the upper eyelid should be done *very conservatively*. It should be noted that contouring is for the purpose of reducing puffiness and hooding of the eyelids and not to create deep-set eyes that was done in the past to westernize Asian upper eyelids which was a misconception of the past that should be considered only of historical interest today. Usually, only the lateral extension of the preaponeurotic fat pad is removed. However, in patients with true upper eyelid fat excess, more aggressive fat excision would be needed to achieve the desired effect.

Additionally, patients with dermatochalasis with no upper eyelid ptosis may be treated with the hinge blepharoplasty technique with good outcomes (Fig. 10). While this technique is a good fixation technique for crease creation, its limitations must be understood. It is a technique

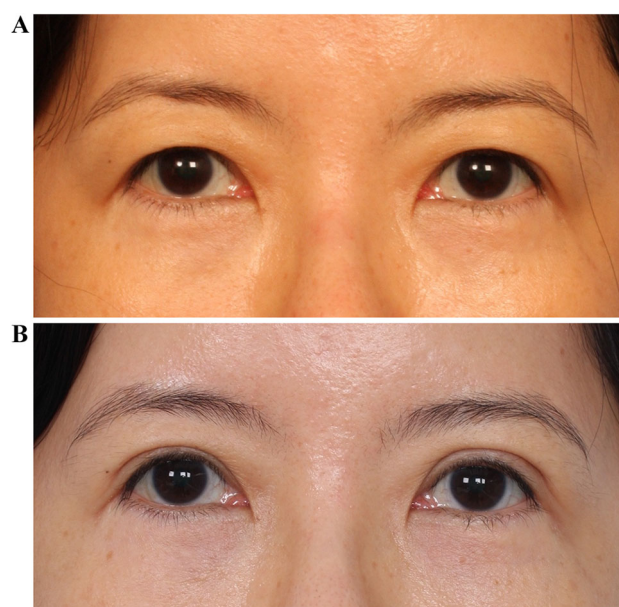


Fig. 9 A and B: A 48-year-old female with bilateral dermatochalasis with no eyelid ptosis. She underwent hinge upper blepharoplasty. The lower incision was fixed at 9 mm from the ciliary margins and 6 mm of skin was excised. Here, she is shown at 2 years post-surgery with crisp and symmetrical upper eyelid crease

that is only predictable in patients with normal eye opening with no blepharoptosis. This is a crucial point in [patient selection](#) for this technique. Many Asian patients presenting for upper blepharoplasty have subclinical or mild ptosis. This is especially common in patients with absent upper eyelid creases. The fibrous dermal insertions from the levator expansion to the skin transmit lifting force from levator to the eyelid margins [47–50]. The absence of these dermal insertions weakens the overall strength of pull on the levator to downstream structures of the upper eyelid. Furthermore, poorly developed dermal insertions may also be a surrogate indicator of less robust levator to superior tarsus insertion in patients without upper eyelid creases. These findings were confirmed by in vivo and cadaveric studies conducted by Kakizaki et al. [32, 38]. These two factors may explain why many patients with absent upper eyelid crease have subclinical or mild upper eyelid ptosis. These patients are often asymptomatic, with minimal or no complaints of difficulty in opening their eyes. However, careful examination may yield diagnostic clue for the presence of pre-operative subclinical ptosis. These include, a slightly narrowed palpebral aperture with a MRD 1 of +4 mm or less, slight compensatory elevation of the medial brow as well as forehead wrinkling with eye opening [29–32]. These clinical findings indicate that patients may have some degree of levator insufficiency. In these patients, the hinge blepharoplasty alone would yield a poor cosmetic and functional results. These patients require a



Fig. 10 A and B: A 14-year-old patient presented with for upper blepharoplasty. On examination, she was noted to have an MRD 1 of + 4 mm and elevation of her medial brow with eye opening was present. A diagnosis of subclinical upper eyelid ptosis was made. In addition to the hinge upper blepharoplasty, levator advancement was done at the same time. The lower incision was made at 8.5 mm from the ciliary margin, and 2 mm of skin was excised. For the levator advancement, on the right advancement from—3mm from the levator musculoaponeurotic junction to the anterior tarsus and on the left—2mm for the levator musculoaponeurotic junction was performed (for details on our ptosis correction, please see References # 29 and 30). The crease was formed in the usual manner with the hinge blepharoplasty method. Here, she is shown at 4 years post-surgery with a crisp natural upper eyelid crease and symmetrical palpebral aperture with a MRD 1 of +5 mm bilaterally and stable brows with eye opening

levator advancement to be incorporated into their upper blepharoplasty. After symmetrical palpebral aperture has been achieved with the levator advancement technique, the crease may be managed with the same hinge blepharoplasty fixation as described in this paper. This combination would provide the optimal aesthetic and functional results for such patients (Fig. 10A and B).

Recently, several authors have incorporated medial epicanthoplasty routinely into their upper blepharoplasty techniques [55–59]. We performed medial epicanthoplasty selectively (in 18% of our patients) as we consider that it may not be necessary to routinely add a medial epicanthoplasty into the upper blepharoplasty to achieve good aesthetic outcomes in all Asian patients. One has to consider adding medial epicanthoplasty to the upper blepharoplasty increase operative time and the extent of the dissection. There is also an increase risks of patient dissatisfaction from the potential of additional scarring (even hypertrophic scarring), asymmetries in the medial canthal area (of the medial starting location of the upper

eyelid crease and from residual epicanthal folds) and the more prolonged recovery. Our indication for medial epicanthoplasty includes patients' specific requests for the procedure, patient wanting to achieve a parallel crease and a more elongated almond-shaped eye and patients with very prominent epicanthal fold giving the eyes a very rounded appearance.

In the literature, Asian blepharoplasty has a revision rate as high as 19% [51–54]. This may perhaps be attributed to a subpopulation of patients having undetected subclinical upper eyelid ptosis who have undergone a cosmetic upper blepharoplasty leading to a suboptimal result. These patients were excluded from our study as upper eyelid ptosis correction is a more complex functional procedure that should not be analyzed with cosmetic upper blepharoplasty. Our relatively low revision rate of 6%, with the majority of these (10/12, 5%) requiring only minor simple skin excisions to balance crease height, is largely due to our approach of actively diagnosing and correcting patients with minor or subclinical ptosis.

Conclusions

The hinge blepharoplasty is a versatile technique. The use of a vascularized orbital septal-aponeurotic flap best (re)-constructs the anatomic and physiologic architecture of the natural Asian “double eyelid”, resulting in a dynamic crease. We have found this technique to be reliable and reproducible in our patients.

Supplementary Information: The online version contains supplementary material available at <https://doi.org/10.1007/s00266-021-02703-8>.

Declarations

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

Human or Animal Rights This article does not contain any studies with human participants or animals performed by any of the authors.

Informed Consent For this type of observational study, informed consent is not required.

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