J. Tokyo Med. Univ., **68**(4) : 367-371, 2010

Review

Infraeyebrow blepharoplasty in East Asia

Akira SUGAMATA

Plastic and Reconstructive Surgery, Tokyo Medical University Hachioji Medical Center

Abstract

An infraeyebrow blepharoplasty has become commonly accepted in East Asia, especially in Japan and Korea. By using infraeyebrow excision, blepharochalasis can be improved without dramatic changes to their facial appearance after operation, and no conspicuous operative scars remain in the lower lateral portion of the upper eyelid as a result of operation, yielding a more natural aesthetic appearance could therefore be obtained. This article provides an overview of upper eyelid anatomy and racial variations, functional indications in upper lid blepharoplasty, and our infraeyebrow blepharoplasty technique.

Introduction

Recently, upper eyelid blepharoplasty is one of the most common aesthetic operative procedures performed in Asia[1-4]. Many of the early signs of aging process in the upper eyelid are a baggy appearance, blepharochalalis, and lateral drooping of the skin. These changes give the appearance of older and tired eyes. When it is associated with limitation of upper visual fields, patient must force contraction of the frontal and levator muscles to achieve an adequate visual field. Continuous contraction of these muscles is associated with chronic headaches and neck stiffness. These aesthetic and functional complaints contribute to a patient's perception of the need for upper lid blepharoplasty.

There are two different operative approaches for blepharoplasty, one approach is through a lid crease (or lower lid) incision[1-6] and the other is an approach by infraeyebrow incision[7-10]. This article provides an overview of upper eyelid anatomy and racial variations, functional indications in upper lid blepharoplasty, and our infraeyebrow blepharoplasty technique[10].

1. Anatomical characteristics in East Asian eyelids

The upper eyelid can be divided into tarsal and orbital portion at the level of the supratarsal fold. The lid crease is formed by the insertion of the filaments of the levator aponeurosis, orbital septum, and fascia on the deep surface of the orbicularis oculi muscle. In the Caucasian eyelids, this insertion is located about 3 to 5 mm above the upper border of the tarsal plate. On the contrary, in the East Asian eyelids ; the point of insertion is lower and between the eyelid margin and superior border of the tarsus. Occasionally, the filaments do not reach the pretarsal skin and orbicularis and fail to form the lid crease[11-15].

The fullness of East Asian upper eyelids is explained by two anatomic differences. First, the preseptal fat layer is directly continuous with the eyebrow fat pad superiorly, which adds thickness to the upper eyelid (Fig. 1). In Caucasians, the eyebrow fat pad extends inferiorly onto the upper eyelid only as an areolar fascial layer along the posterior aspect of the orbicularis oculi muscle. In East Asians, however, often a true adipose continuation of the brow fat may be located as far inferiorly as the eyelash line, adding bulk to the entire

Received May 17, 2010, Accepted June 30, 2010
Key words : Blepharoplasty, Upper blepharoplasty, Blepharochalasis, Baggy eyelid
Corresponding author : Akira SUGAMATA, Tatemachi 1163, Hachioji City, Tokyo 193-0998, Japan
TEL : 0426-65-5611 (2305) FAX : 0426-65-1796

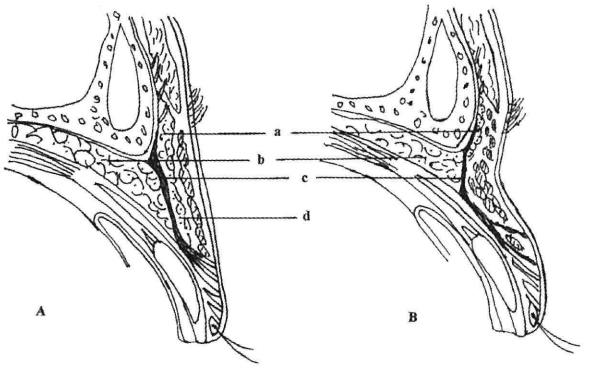

Fig. 1 Anatomy of the upper eyelid.
A : Asian B : Caucasian a : Brow fat pad
b : Preaponeurotic fat pad c : Orbital septum
d : Preseptal fat

eyelid[13]. In the second anatomical difference, the preaponeurotic fat pad, which is contained within the orbit by the septum, is also more prominent. In Caucasians, the septum fuses with the levator aponeurosis at the superior aspect of the tarsus, preventing the anterior and inferior migration of the preaponeurotic fat. In East Asians, the inferior portion of the orbital septum becomes attenuated, providing little containment for the preaponeurotic fat ; and the fat appears more prominent anteriorly and inferiorly within the upper eyelid[11)13)16)].

2. Aging of upper eyelid

2.1. Upper eyelid skin

Eyelid skin is the thinnest of the body and is unique in having no subcutaneous fat layer. The upper eyelid skin of East Asians is thicker than Caucasians[17]. The upper tarsal skin is reported to be 832±213 μm in thickness in East Asians[18]. However, upper eyelid skin thickness is not affected remarkably by aging[19]. However, the loss of skin elastic fiber and the skin laxity are marked and parallel the advance of age[20]. Gonzales-Ullooa described the changes in the face that are both a result of repeated use and gravity[21]. At approximately 30 years of age, the skin begins to sag and the upper eyelids become redundant. By age 50, the upper eyelid skin has sagged and lost enough elasticity to begin to contact eyelashes. Lateral hooding develops because of the descent of the eyebrow and the redundant facial skin.

2.2. Orbicularis oculi

Histologically, the whole muscle layer of the orbicularis oculi is intact, with no signs of aging ; loss of fibers, loss of adherence to surrounding structure, or ptosis. Neurophysiologic studies of the electromyographic interference pattern of the orbicularis oculi confirmed that the full efficiency of orbicularis oculi function was intact in the old age group compared to younger groups[20]. However, the skin and muscle are attached firmly and attenuated ; they have stretched together, and have equal excess in aging[22)23)]. In upper blepharoplasty, the rationale for muscle resection along with skin is uncertain ; however, the orbital septum and fat pad are more easily exposed and treated after muscle resection with the skin[23].

2.3. Orbital septum

The orbital septum is an effective barrier against the anterior prolapse of orbital fat. The eyelid fat pads become prominent as the orbital septum thins and loosens with aging and becomes a less effective barrier against the anterior and inferior prolapse of orbital fat or fat pads. Eyelid bags are the result of relaxation of lid structure like the skin, the orbicularis oculi, and mainly the septum[24]. It makes more sense to reposition the fat into the orbit by tightening the relaxed lid structures, mainly the orbital septum[24)25)].

3. Approach to blepharoplasty

3.1. Lid crease (lower lid) approach

Most of upper eyelid blepharoplasty is performed through an incision into the lid crease (or lower lid)[1-6]. The greatest merit of these approaches is that correction of aponeurotic blepharoptosis can be performed at the same time without a separate procedure[26)27)]. In patients who request a double-eyelid upper blepharoplasty, a lower lid incision is also available to create a new crease by fixing the pretarsal skin to the levator mechanism[2)28)]. Another merit of these approaches is that the surgeon can regulate the height of the eyelid crease according to the wishes of the patient. However from aesthetic point of view, there are some shortcomings of lid creases and lower lid incision in Eastern Asian patients. As the width of the skin excision through the lid crease or lower lid increases, an unnatural appearance after the operation has often been reported by many plastic surgeons[8-10]. One of these undesirable results is that a discrepancy between the nature and thickness of the sutured upper and lower skin accentuates the overhanging appearance of the upper skin on the crease line[8]. Another undesirable result is that an overly defined lid crease after this operation often gives the impression of a "surprised look"[8-10]. In patients who do not desire double eyelid procedure, to retain the natural East Asian flat eyelid with no lid crease is also difficult after a low lid incision[10]. In addition, in these incisions, to remove lateral drooping skin in the upper eyelid, extension of skin excision must be carried out laterally to the corner of the eyebrow in an upward angle in one of the natural lateral creases to prevent a lateral dog-ear of skin. These lateral extended operative scars are often conspicuous in Eastern Asian patients[9)10)].

3.2. Infraeyebrow approach

To improve the shortcomings of blepharoplasty done through the lid crease and low eyelid, an infraeyebrow skin and orbicularis excision technique has been com-

monly accepted in East Asia[8-10]. To perform infraeyebrow excision, blepharochalasis can be improved without dramatic changes to their facial appearance after operation, and no conspicuous operative scars are produced in the lower lateral portion of the upper eyelid as a result of operation ; a more natural aesthetic appearance could therefore be obtained[8-10]. The only aesthetic disadvantage of this approach is slight brow flattening and shortening of the brow and ciliary distance[8)10].

4. Our infrabrow blepharoplasty technique

4.1. Patients

The primary indication for our operation method included patients who complain of superior visual field limitation and aesthetic discomfort with blepharochalasis, but who do not have obvious levator muscle dysfunction. We consider the operative procedure indicated in patients who have levator function was better than 8 mm[10].

4.2. Design of skin excision

Before the operation, we make a rough estimate to decide the quantity of skin resection by pinching the surplus skin with forceps in the infraeyebrow area while patients are in the sitting position. The greatest width of skin excision should be enough to improve lateral drooping of the skin. With the patient in a supine position on the operating table, an upper excision line is drawn following the lower edge of the eyebrow from 2～3 mm lateral to the medial angle of the eye to the lateral end of the eyebrow. At the end point of the eyebrow, the excision line is extended upwards approximately 10～15 mm at an angle of 30°. The lower excision line begins from the same point as the upper line and increases in width laterally to the lateral two-thirds point of the eyebrow to create a spindle shape. The lower line then extends almost parallel with the upper line to the axis through the end point of the eyebrow. At the cross point of the lower excision line and the axis through the end point of the eyebrow, the lower excision line extends directly to the end point of the upper excision line (Fig. 2). This design enables us to excise most of the slack lateral eyelid skin and subcutaneous tissue. The greatest width of skin excision from the lateral eyelid that will improve lid drooping should be 8～12 mm.

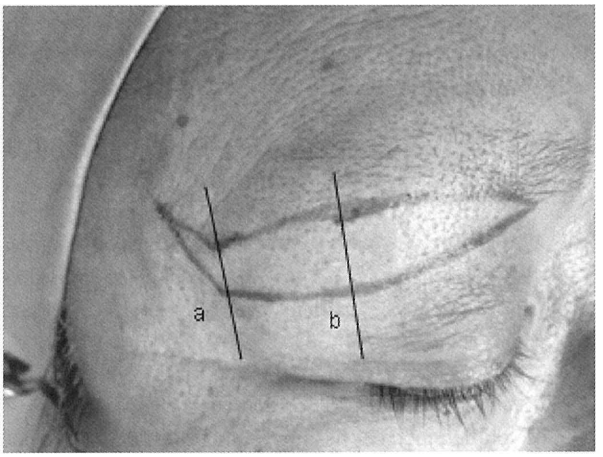

Fig. 2 Design of the skin excision. At the end point of the eyebrow, the excision line is extended straight up at an angle 30° [a]. The greatest width is at the lateral two-thirds point of the eyebrow [b].

4.3. Operative procedure

The operation is performed under local anaesthesia using 1% lidocaine with epinephrine. The skin and subcutaneous fat tissue is excised totally from the surface of the orbicularis oculi muscle. After the excision of skin and fat tissue, the orbicularis oculi is also excised 1～2 mm inside of the skin excision line and the preseptal fat tissue is excised in the same area if it is distensible. Once this step is completed, the orbital septum is identified. The orbital septum is caught with forceps in

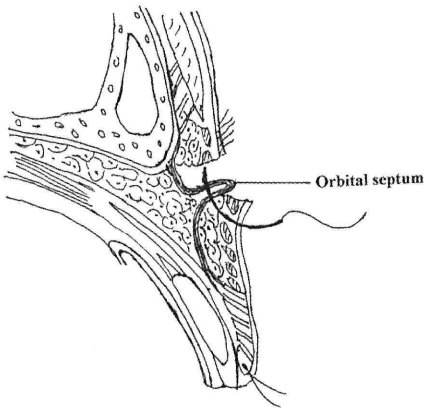

Fig. 3 Tucking of the orbital septum.

Fig. 4 A 62-year old woman. Preoperative view [A]. The greatest width of excised bilateral skin was 7 mm. Seven months after the operation [B].

Fig. 5 A 61-year old woman. Preoperative view [A]. The greatest width of excised bilateral skin was 8 mm. One year after the operation [B].

this condition, and it should be pulled gently to confirm that it pulls the tarsal plate together. After confirmation of the orbital septum, the orbicularis oculi is sutured end to end with plication of the orbital septum using 5/0 nylon thread (Fig. 3). Plication is always achieved with 5～6 stitches. Subcutaneous tissue is sutured with 6/0 polydioxanone thread and the surface skin is closed with 6/0 nylon thread.

4.4. Operative results

All patients reported improvement in the upper visual fields and amelioration of headaches and neck stiffness. The lateral drooping of the lid skin was improved and the lid crease became more clearly defined than before the operation (Fig. 4, 5). All patients were satisfied with the rejuvenation in the upper eyelid. The shortening ratio for the distance between the eyebrow and cilia at the middle point of the upper lid crease in primary gaze was 10%～52.6% (mean 27.3%) with our method[10].

Discussion

In older East Asian people, the preaponeurotic fat pad appears more prominent anteriorly and inferiorly in the upper eyelid[3]. Eyelid bags are the result of relaxation of lid structures like the skin, the orbicularis oculi, and mainly the orbital septum. Therefore this baggy appearance cannot be improved sufficiently by only a skin and orbicularis oculi resection[24)25)]. To improve this baggy appearance, tucking of the orbital septum with infraeyebrow excision of the skin and the orbicularis oculi which we use is very effective[10]. In addition, tucking of the orbital septum has the effect of mild static suspension of the tarsal plate due to septal attachment to the levator aponeurosis and the tarsal plate in the lower region of the upper eyelid[10)29)]. After infraeyebrow excision blepharoplasty with tucking of the orbital septum, the concealed lid crease becomes apparent and a good rejuvenation effect is obtained. This technique is especially effective in lifting lateral drooping eyelids, which is relatively difficult to improve using a conventional lid crease incision[9)30)].

We did not encounter any serious complications such as lagophthalmos which is often shown in upper blepharoplasty through lid crease or low lid incision[31)32)]. Our particular possible complication of infraeyebrow blepharoplasty is total damage to the supraorbital neurovascular bundle[9]. However, we had no patients with this postoperative condition after the operation. In a few cases, there were complaints of sensory disturbance around the eyebrow, although these resolved after several months. In some cases, postoperative edema and subcutaneous blood invasion were more prevalent than with the skin-only resection method ; however these also cleared up in a week or two. Aesthetically, the brow and ciliary distance was noticeably shortened to a slight degree and brow flattening has been noted in some cases, but there have been no patients concerned by these outcomes[8)10)].

We confirmed that infraeyebrow blepharoplasty with tucking of the orbital septum is a simple and effective operation for functional and aesthetic improvement of blepharochalasis with baggy eyelids in East Asian patients. However, the indications of this technique in Caucasian people should be considered carefully[9)10)]. One reason is that the position of the eyebrow is low and the distance between the eyebrow and the cilia is short in Caucasians, so it is difficult to excise a wide band of skin and muscle in the infra-eyebrow area[9)10)]. The other reason is that most of the orbital septum is firmly attached to the levator aponeurosis in the upper eyelid in Caucasians[2)14)28)], so anatomically it is difficult to tuck up and suture the septum.

References

1) Onizuka T, Iwanami M : Blepharoplasty in Japan. Aesth Plast Surg **8** : 97-100, 1984
2) Watanabe K : Mesurment method of upper blepharoplasty for Orientalis. Aesth Plast Surg **17** : 1-8, 1993
3) Kim DW, Bhatki AM : Upper blepharoplasty in the Asian eyelid. Facial Plast Surg Clin N Am **15** : 327-335, 2007
4) Kruavit A : Asian blepharoplasty : an 18-year experience in 6215 oatients. Aesthetic Surg J **29** : 272-283, 2009
5) Scaccia FJ, Hoffman JA, Stepnich DW : Upper eyelid blepharoplasty. Arch Otolaryngol Head Neck Surg **120** : 827-830, 1994
6) Rohrich RJ, Coberly DM, Fagien S, Stuzin JM : Current concept in aesthetic upper blepharoplasty. Plast Reconstr Surg **113** : 32e-42e, 2004
7) Parkes ML, Kamer FM, Merrin ML : Infrabrow lift. Laryngoscope **86** : 1869-1872, 1976
8) Kim YS, Roh TS, Yoo WM, Tark KC : Infrabrow excision blepharoplasty : applications and outcome in upper blepharoplasty in Asian women. Plast Reconstr Surg **122** : 1199-1205, 2008
9) Lee D, Law V : Subbrow blepharoplasty for upper eyelids rejuvenation in Asians. Aesthetic Surg J **29** : 284-288, 2009
10) Sugamata A, Yoshizawa N : Infraeyebrow excision blepharoplasty for Japanese blepharochalasis : review of 35 patients over 60 years old. J Plast Surg Hand Surg **44** : 17-20, 2010
11) Meyer DR, Linberg JV, Wobig JL, McCormick SA : Anatomy of the orbital septum and associated eyelid connective tissue. Opthalmic Plast Reconstr Surg, **7** : 104-113, 1991
12) Brémond-Gignac DS, Deplus S, Cussenot O, Lassen JP : Anatomic study of the orbital septum. Surg Radiol Anat **16** : 121-124, 1994

13) Sieff S : Anatomy of the Asian eyelid. Facial Plast Surg Clin North Am **4** : 1-5, 1996
14) Chen WPD : 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, 2007
15) Jeong S, Lemke BN, Dortzbach RK, Park YG, Kang HK : The Asian upper eyelid : an anatomical study with comparison to the Caucasian eyelid. Arch Ophthalmol **117** : 907-912, 1999
16) Kakizaki H, Leibovitch I, Selva D, Asamoto K, Nakano T : Orbital septum attachment of the levator aponeurosis in Asians : in vivo and cadaver study. Ophthalmol **116** : 2031-2035, 2009
17) Ha RY, Nojima K, AdamsWP, Brown SA : Analysis of facial skin thickness : defining the relative thickness index. Plast Reconstr Surg **115** : 1769-1773, 2005
18) Hwang K, Kim DJ, Hwang SH : The thickness of Korean upper eyelid skin in different level. J Craniofacial Surg, **17** : 54-56, 2006
19) Hwang K, Kim DJ, Kim SK : Does the upper eyelid skin become thinner with age ? J Craniofacial Surg **17** : 474-476, 2006
20) Pattier F, El-Shazly NZ, El-Shazly AE : Aging of orbicularis oculi : anatomophysiologic consideration in upper blepharoplasty. Arch Facial Plast Surg **10** : 346-349, 2008
21) Gonzales-Ulloa M, Flores ES : Senility of the face-basic study to understand its causes and effect. Plast Reconstr Surg **36** : 474-476, 1965
22) Gradinger GP : Cosmetic upper blepharoplasty. Clin Plast Surg **15** : 289-297, 1988
23) Hoorntje LE, Van der Lei B, Stollenwerck GA, Kon M : Resecting orbicularis oculi muscle in upper eyelid blepharoplasty — a review of the literature. J Plast Reconstr Aesthe Surg **63** : 787-792, 2010
24) Mühlbauer W, Holm C : Orbital septorhaphy for the correction of baggy upper and lower eyelids, Aesthe Plast Surg **24** : 418-423, 2000
25) Choo PH, Rathbun JE : Cautery of the orbital septum during blepharoplasty. Ophthal Plast Reconstr Surg **19** : 1-4, 2003
26) Carraway JH, Tran P : Blepharoplasty with ptosis repair. Aesthetic Surg J **29** : 54-61, 2009
27) de la Torre JI, Martin SA, de Cordier BC, AI-Hakeem MS, Collawn SS, VásconezLO : Aesthetic eyelid ptosis correction : a review of technique and cases. Plast Reconstr Surg **112** : 655-660, 2003
28) McCurdy JA : Upper blepharoplasty in the Asian patient : the "double eyelid" operation. Facial Plast Surg Clin N Am **13** : 47-64, 2005
29) Reid RR, Said HK, Yu M, Haines GK, Few JW : Revisiting upper eyelid anatomy : introduction of the septal extension. Plast Reconstr Surg **117** : 65-70, 2004
30) Har-Shai Y, Hirshowitz B : Extended upper blepharoplasty for lateral hooding of the upper eyelid using a scalpel-shaped excision : a 13-year experience. Plast Reconstr Surg **113** : 1028-1035, 2004
31) Lelli GJ, Lisman RD : Blepharoplasty complications. Plast Reconstr Surg **125** : 1007-1017, 2010
32) Trussler AP, Rohrich RJ : Blepharoplasty. Plast Reconstr Surg **121** : 1-10, 2008

東アジアにおける眉下切開による上眼瞼形成術

菅 又 章

東京医科大学八王子医療センター形成外科

眉下切開による上眼瞼形成術は、東アジアで一般的に行われている手術法である。眉下切開による上眼瞼の皮膚弛緩症に対する上眼瞼形成術では、手術後に顔貌の著しい変化を引き起こすことが無く、上眼瞼外側下部に目立った手術瘢痕も形成しない利点がある。これにより、より自然な美容的効果が獲得できる。われわれは、眉下切開による上眼瞼除皺術において、皮膚、眼輪筋の切除と同時に、眼窩隔膜のつり上げを行ってよい結果を得ている。この論文では、上眼瞼の解剖、人種特異性、加齢変化を解説し、われわれの行っている眉下切開法の手術法の概要に関して解説する。

〈キーワード〉 眼瞼形成術、上眼瞼形成術、眼瞼皮膚弛緩症、除皺術、上眼瞼