

# Staged Surgery with Total Excision and Lamellar Reconstructive for Medium-sized Divided Nevus of the Eyelids

Rong Lu, MD, PhD  
Qian Li, MD  
Yadan Quan, MD  
Kang Li, MD  
Jinling Liu, MD

**Background:** To explore a prior treatment strategy for medium-sized (1.5–20 cm) divided nevus of the eyelids.

**Methods:** Six patients who suffered from divided nevus of eyelids were recruited to this prospective, case series study between July 2008 and January 2014 (4 male and 2 female patients). The patients' ages ranged from 14 to 29 years, with an average age of 24.5 years. All lesions were medium-sized (1.5–20 cm in diameter) and invaded eyelid margins and the posterior lamella of eyelids. Staged surgery involved total excision of lesions and then repair of the defects with advanced skin flaps and tarsoconjunctival flaps. Two staged surgeries were completed at intervals of at least 3 months.

**Results:** All of the patients were followed up at least 3 months after the second surgery. Malignant transformation and recurrence were not observed. All of the flaps survived well, and all of the donor sites were healed with inconspicuous scarring. The only complication was eyelash sacrifices, and 5 of 6 patients suffered from this complication. Excellent cosmetic results were gained in all patients, with the exception of 1 patient who thought his postoperative appearance was only good because of the impalpable disparity in color and thickness between the skin flaps and recipient sites.

**Conclusions:** A staged surgery approach with the total excision of lesions and lamellar reconstructive procedures to repair the defect is a reasonable treatment strategy and can achieve satisfactory cosmetic results for medium-sized (1.5–20 cm in diameter) divided nevus of eyelid. (*Plast Reconstr Surg Glob Open* 2015;3:e438; doi: 10.1097/GOX.0000000000000389; Published online 25 June 2015.)

**D**ivided nevus of the eyelid simultaneously occurs on the contiguous area of the eyelids; the 2 parts of nevi integrate when eyelids are

closed. This peculiar disease was first described by Fuchs in 1919.<sup>1</sup> Previous embryological studies have justified the deduction that divided nevus forms in between the 12th and 14th weeks of gestation when eyelids fuse, and it begins to divide with separation of eyelids in the 20th week of gestation.<sup>2</sup> Clinically, divided nevus of the eyelids is of varying size and is categorized into 3 groups based on the maximum

*From the Department of Orbital Disease and Ocular Tumor, Zhongshan Ophthalmic Center, State Key Laboratory of Ophthalmology, Sun Yat-sen University, Guangzhou, Guangdong, People's Republic of China.*

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diameter of the lesion: (1) small (<1.5 cm), (2) medium (1.5–20 cm), and (3) large (>20 cm).<sup>3</sup> The small nevus customarily behaves like planuspunctum and usually results only in disfigurement. However, the medium and large types may result in several functional defects.<sup>4</sup> Moreover, the disease makes the patient a target of ridicule and produces other societal integration problems due to aesthetic issues.<sup>5,6</sup> More importantly, although small-to-medium congenital divided nevus has a low risk of malignant transformation<sup>7–10</sup>, the outcome has already been reported for large type.<sup>11</sup>

Under such circumstances, the selection of effective therapeutic methods is of paramount importance. Dermabrasion, cryotherapy, and laser therapy may achieve superior effects in managing small divided nevi. Nevertheless, once the nevus cells encroach into deeper dermis or extend across a larger range, there is no scope for displaying the abilities of these therapeutic methods.<sup>5,12,13</sup> Thus far, surgery is recommended for the disease. However, there is no consensus among surgeons about the cause of adopting 1-stage surgery or staged surgery or whether we should perform proactive surgery for small-to-medium divided nevi. Furthermore, deciding how to reconstruct the eyelid after excision remains controversial. In this article, we propose a staged surgery to observe and assess its treatment effectiveness and cosmetic outcomes for medium-sized (1.5–20 cm) divided nevus of the eyelids.

## METHODS

Patients who suffered from divided nevus of the eyelids were recruited to participate in this prospective, case series study. The Zhongshan Ophthalmic Center, Sun Yat-sen University, ratified the research and provided ethical approbation. The prospective study was in accordance with Health Insurance Portability and Accountability Act regulations. All investigations in this study adhered to the tenets of the Declaration of Helsinki.

We enrolled 6 patients with divided nevus of the eyelids attending our clinic between July 2008 and January 2014 (4 male and 2 female patients). The patients' ages ranged from 14 to 29 years at the time of initial diagnosis in our clinic, with an average age of 24.5 years. The lesions of these 6 patients slowly enlarged, except for that of patient 1, whose lesion rapidly exacerbated after procreation. Of note, the remnant nevus displayed evolution after excision 10 years ago in patient 2. In addition, patient 5 suffered abrupt hemorrhages and pyorrhea. The largest nevi situated in upper and lower eyelids were 2.3×2.0 cm and 1.5×3.5 cm, respec-

tively. All lesions invaded eyelid margins and posterior lamella of eyelid. The chief complaint of these patients was malformed physiognomy. In particular, the dramatic transmutations of patients 1, 2, and 5 motivated the surgery. Total ablation of the pathological changes on both eyelids and tarsal plates served as the cardinal idea of surgery. In addition, we preferred staged surgery rather than 1-stage surgery for patients. In the first-stage surgery, the nevus located in upper or lower eyelid was dissected; meanwhile, advanced skin flaps were transferred to smooth the cutaneous deficiency over a foundation of tarsoconjunctival flaps. In anticipation of scarring, the related eyelid was managed in the second-stage surgery with same surgical procedures at least 3 months later. All surgeries were completed by same surgeon. The clinical archives are presented in Table 1.

During the surgery, the incision was tailored and marked with Gentian Violet (Guangzhou Mingjia Equipment Manufacture Co., Guangzhou, China) 1.0–2.0 mm outside the boundaries of the nevus, and prophylactic preservation of lacrimal passages was required as the operations progressed. Histopathological examination was routinely used to identify the histological type of the nevus. Postoperatively, more weight must be placed on the status of advanced skin flaps and secondary symptoms originating from ocular surface reconstruction. After suture removal, follow-up was carried out for at least 3 months.

## RESULTS

In our series, 6 patients underwent staged surgery including total excision and reconstruction of the eyelids with transferred tarsoconjunctival and advanced skin flaps. All patients were followed up for at least 3 months after the second surgery. The most frequent complication in the convalescent stage was eyelash sacrifice, and 5 of the 6 patients suffered from this complication. All these patients embraced the hardly detectable change. Histological examination revealed benign intradermal or compound type without malignant transformation. However, the specimen from patients 1, 4, and 6 indicated active cellular proliferation in part of the region, and the pathologist suggested paying close attention and observation. Malignant transformation and recurrence were not observed during the follow-up period. No other functional complications occurred. The skin flaps and recipient sites had commendable coherence with regard to thickness, color, texture, and elasticity.

The main measures used to appraise the cosmetic outcomes are as follows: (1) shape of the operative eye evaluated by length of the palpebral fissure, radi-

**Table 1. Clinical Archive: Lesion Characteristics, Treatments, and Outcomes of 6 Patients with Divided Nevus**

Patient	Sex	Age	Previous History	Size (cm)	Location	Involvement and Appearance	Treatment	Histological Type	Postoperative Complications
1	Female	28	Enlarging since 40 d of age with rapid exacerbation after procreation	Upper eyelid: 2.1 × 1.7 Lower eyelid: 2.1 × 1.0	Oculus Dexter	Lateral upper and lower eyelids involvement, with granular appearance of the nevus	Complete resection and reconstruction of eyelids with advanced skin flaps and tarsoconjunctival flaps	Intradermal type, with active cellular proliferation in part of the region	Part of the eyelashes lost
2	Male	28	Appeared from childhood and enlarged after excision 10 y ago with evolution of the remnant nevus	Upper eyelid: 2.3 × 1.0 Lower eyelid: 1.3 × 0.6	Oculus Sinister	Medial upper and lower eyelids, lacrimal puncta involvement, with verrucous nevus and abnormal chromatosis on palpebral conjunctiva	Complete resection, reopening of the inferior lacrimal canaliculi and reconstruction of eyelids with advanced skin flaps and tarsoconjunctival flaps	Intradermal type	Slight asymmetry of the flaps and recipient site in color and thickness Part of the eyelashes lost
3	Male	29	Gradually enlarging since he grew up	Upper eyelid: 1.0 × 0.5 Lower eyelid: 1.5 × 1.0	Oculus Sinister	Central upper and lower eyelids involvement, with dark spot raised above the margin of lower eyelid	Complete resection and reconstruction of eyelids with advanced skin flaps and tarsoconjunctival flaps	Compound type	Part of the eyelashes lost
4	Male	14	Gradually enlarging for the past few years	Upper eyelid: 1.5 × 1.5 Lower eyelid: 1.5 × 3.5	Oculus Dexter	Central upper and lower eyelids involvement, with pigmented nevus and rough palpebral conjunctiva	Complete resection and reconstruction of eyelids with advanced skin flaps and tarsoconjunctival flaps	Intradermal type, with active cellular proliferation in part of the region	None
5	Female	22	Abrupt hemorrhage and pyorrhea after slow growing since she was born	Upper eyelid: 2.3 × 2.0 Lower eyelid: 1.5 × 3.5	Oculus Sinister	Lateral upper and lower eyelids involvement, with hemorrhage and pyorrhea of the nevus	Complete resection and reconstruction of eyelids with advanced skin flaps and tarsoconjunctival flaps	Intradermal type	Part of the eyelashes lost
6	Male	26	Gradually enlarging since he grew up	Upper eyelid: 1.4 × 1.6 Lower eyelid: 1.5 × 1.7	Oculus Sinister	Central upper and lower eyelids involvement, with irregular eyelashes in formation	Complete resection and reconstruction of eyelids with advanced skin flaps and tarsoconjunctival flaps	Intradermal type, with active cellular proliferation in part of the region	Part of the eyelashes lost

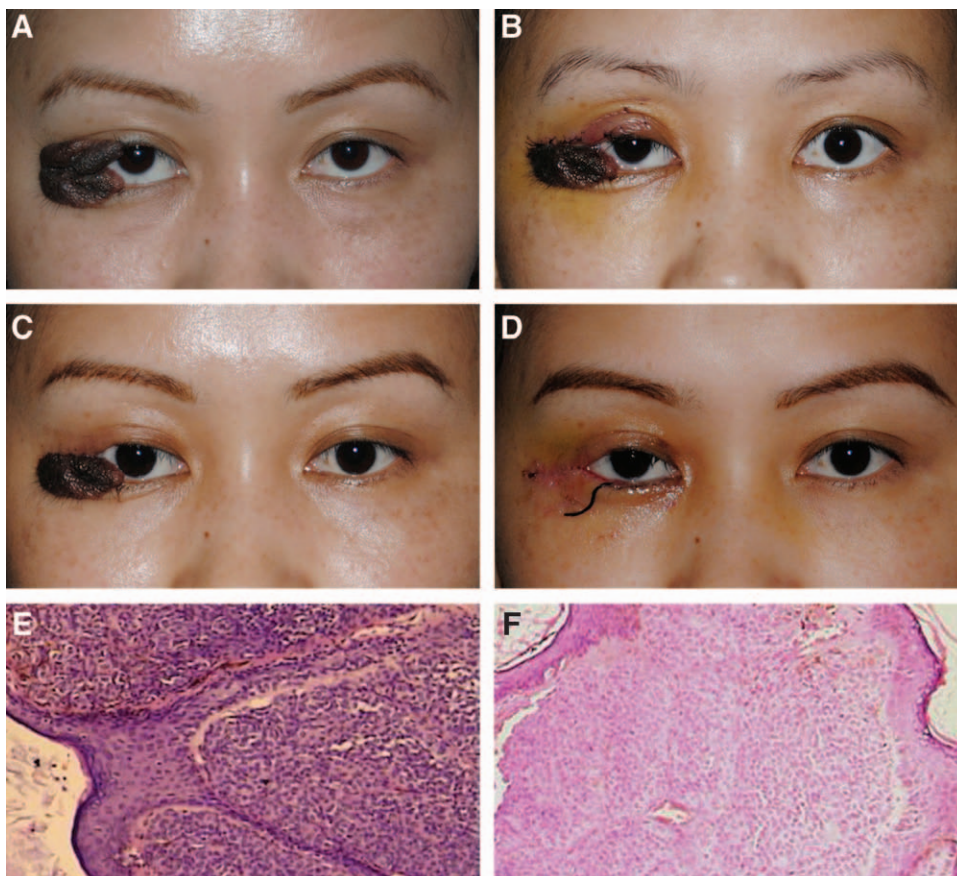
an of the eyelids, and symmetry of the bilateral eyes; (2) physiologic similarity between the skin flaps and recipient sites; and (3) degree of cosmetic satisfaction of both doctors and patients. The criteria for evaluation were as follows: excellent, an inconspicuous scar with coherence with the neighboring skin; good, a mildly noticeable scar; and poor, an obvious scar on facial surface. Excellent cosmetic results were obtained in 5 patients, and no patient thought that the postoperative appearance was poor. Only patient 2 thought his features after surgery looked good because of the impalpable difference in color and thickness between the skin flaps and recipient sites.

Herein, we expound on the staged surgical procedures performed in 3 representative cases

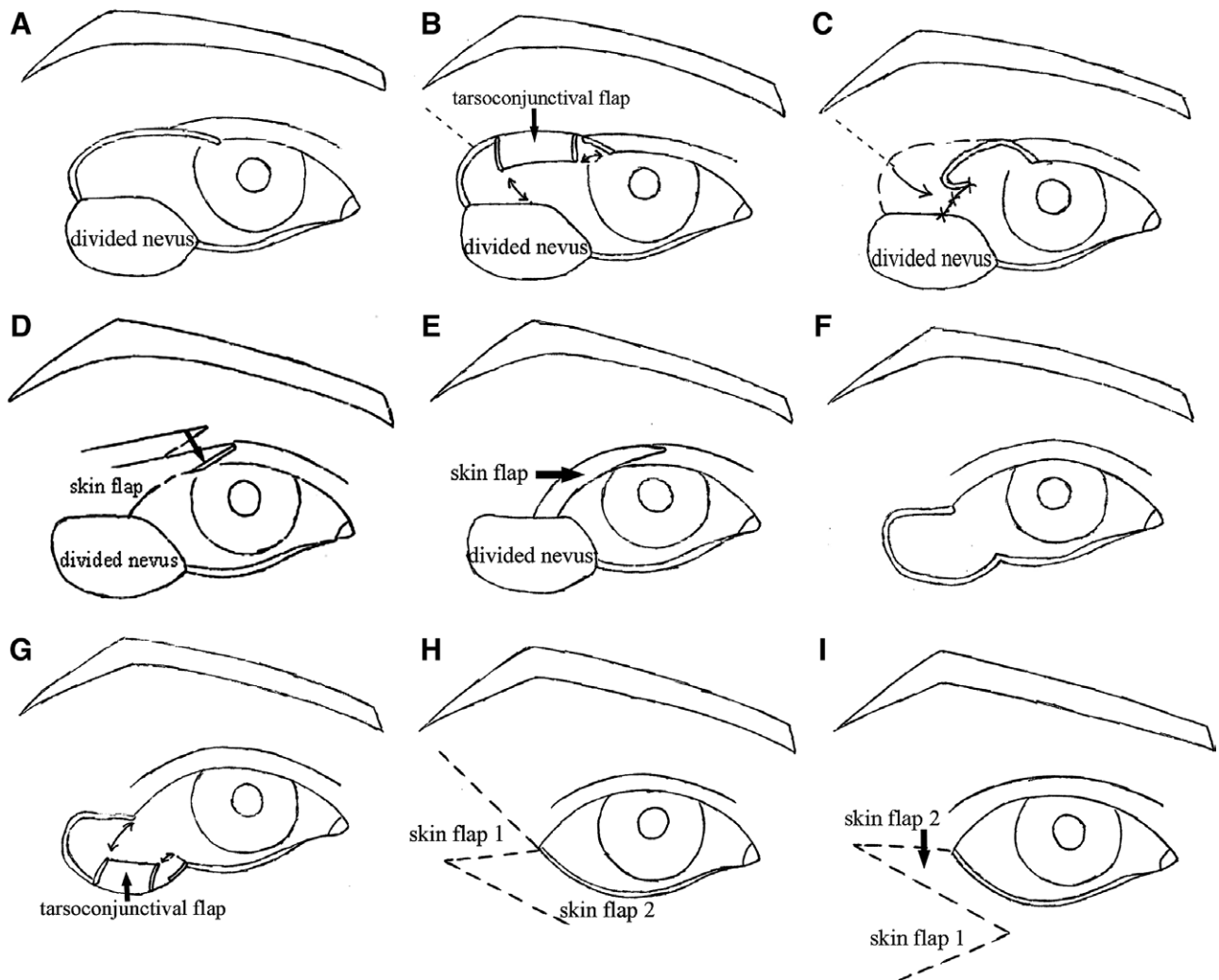
#### Case 1

A 28-year-old woman was hospitalized due to a rapid exacerbation of divided nevus of the eyelids after procreation (patient 1). Upon physical examination, 2.1×1.7 cm and 2.1×1.0 cm sized black granular nevi

were located on upper and lower eyelids, respectively (Fig. 1A). The first-stage surgery involved a full-thickness debulking with a bracket-shaped excision of the divided nevus located in upper eyelid (Fig. 2A). Next, the lateral canthus was removed to decrease interfacial surface tension. The gray-line was split, and the residual tarsoconjunctival flap (tarsus and surrounding conjunctiva) was dissociated, mobilized downward, and secured to the remaining medial and lateral tarsal edges to repair the tarsus defect (Fig. 2B). An oblique incision was made to free the lateral region of skin and form a skin flap, and then, the flap was secured to lateral canthus (Fig. 2C). Another triangular skin flap was fashioned from the temporal skin of upper eyelid and transferred into the residual dermis defect (Fig. 2D). The inferior border was trimmed elaborately (Fig. 2E). The tarsoconjunctival flap and pedicled skin flaps were sutured with 5-0 and 6-0 silk sutures to form new eyelid margin. The defects of donor sites were directly closed with 6-0 absorbable sutures. A satisfying outcome was achieved at 5 days post operation (Fig. 1B). The scar became stable over the course of 3 months, and



**Fig. 1.** A, The divided nevus in a 28-year-old woman (patient 1), occupying lateral eyelids. The lesions exacerbated rapidly after her procreation. B, Five days after the first-stage surgery. C, A photograph before the second-stage surgery and 3 months after the first-stage surgery. D, Five days after the second-stage surgery. E and F, The specimens of 2 surgeries both were of intra-dermal type with active cellular proliferation in part of the region (original magnification ×10).



**Fig. 2.** Composite of line drawings (A–E) illustrated surgical procedures in the first-stage surgery and (F–I) illustrated procedures in the second-stage surgery. A, Upper eyelid defect after resection of the nevus, which was around 1/2 of eyelid length. B, The tarsoconjunctival flap slid downward and secured to the remaining medial and lateral tarsal edges. C, Advanced lateral skin flap and secured it to lateral canthus. D, Mobilized another skin flap fashioned from lateral region to repair the residual dermis defect. E, After skin flaps advanced medially, the inferior border was trimmed and flaps were secured in position. F, Lower eyelid defect after resection of the nevus, which was around 1/2 of eyelid length. G, The tarsoconjunctival flap migrated upward to form the posterior lamella of lower eyelid. H, Three incisions were performed of a pair of z-flaps. I, The 2 z-plasty flaps were reversed and secured into position to repair the defect of anterior lamella of lower eyelid. The dotted lines represent incisions of the skin.

then, the patient underwent the second-stage surgery (Fig. 1C). In the second-stage surgery, the lower eyelid portion of divided nevus was ablated with 1.0 mm of surrounding normal tissue (Fig. 2F). Around 1.5 mm of the tarsus with tarsal conjunctiva on lower eyelid was excised vertically. The tarsoconjunctival flap was prepared from the inferior region and migrated upward to form the posterior lamella of lower eyelid (Fig. 2G). The region surrounding the incision was maintained as a pair of z-flaps by 3 incisions (Fig. 2H). Then, the 2 pedicled z-plasty flaps were interchanged and advanced on the newly built tarsus to cover the cutaneous defect (Fig. 2I). The newly formed eyelid margin was fixed to the lateral

tarsal ligament. The appearance of the patient after recovery period was cosmetically excellent (Fig. 1D). The pathologic examination from 2-stage surgeries showed that both defects were of intradermal type with active cellular proliferation in part of the region (Fig. 1E, F).

#### Case 2

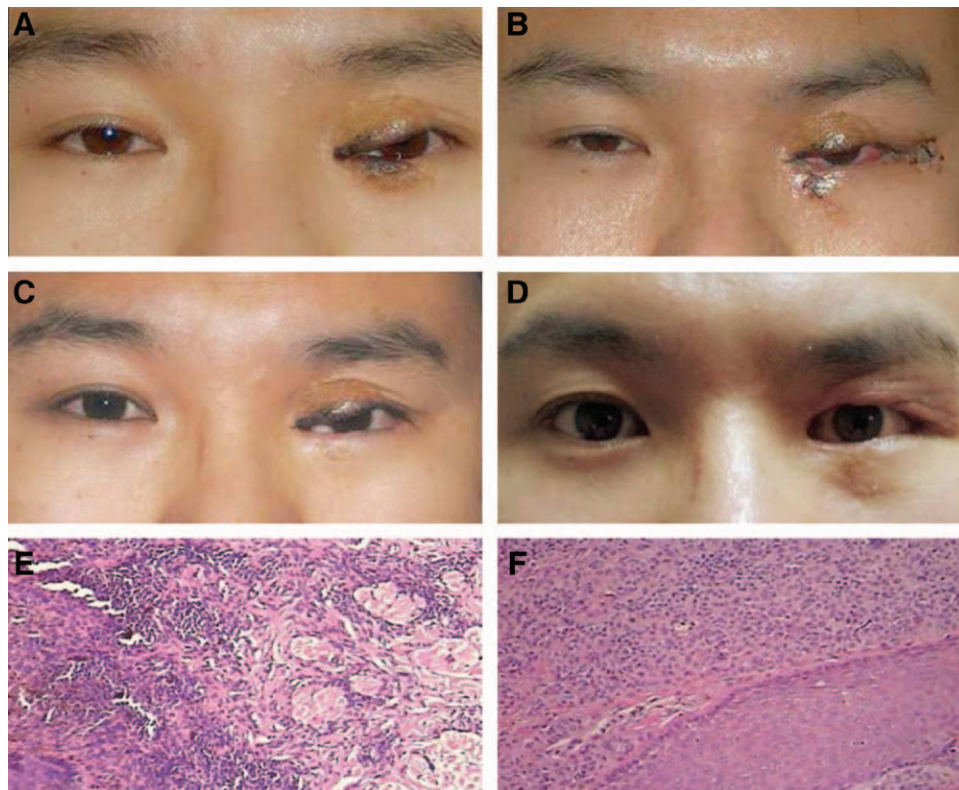
A 28-year-old man with a previous tumorectomy and free skin grafting 10 years ago was admitted to our clinic for evolution of the remnant nevus (patient 2). The recurrent lesion had a diameter of  $2.3 \times 1.0$  cm and  $1.3 \times 0.6$  cm on upper and lower eyelids, respectively. Upon examination, a verrucous nevus affected eyelids, and there was an

abnormal chromatinosis on palpebral conjunctiva (Fig. 3A). In the first-stage surgery, the patient was treated with a complete wedge excision of the nevus of lower eyelid, including 1.5mm of adjacent tissue (Fig. 4A). The lower canaliculus lacrimalis was broken after debulking. The anterior and posterior valves were sutured to the skin and conjunctiva, respectively, after splitting the end. Vertical incisions were made from edges of the defect down through the residual tarsus and conjunctiva. The tarsoconjunctival flap was freed from the overlying musculus orbicularis oculi. Similarly, the lateral canthal ligament was partly cut off, and the tarsoconjunctival flap was displaced and secured on the remaining edges (Fig. 4B, C). The region surrounding the incision was maintained as a pair of z-flaps by 3 oblique incisions (Fig. 4D). Those 2 pedicled triangular flaps were interchanged and advanced to the newly built tarsus (Fig. 4E). The marginal tarsus and skin flaps were sutured with 5-0 and 6-0 silk sutures. A lateral canthoplasty was performed to prevent a cat-like appearance. Finally, the twin needle stitch was used to deepen lateral conjunctival capsule. A photograph taken 5 days after the surgery presented a favorable aesthetic result (Fig. 3B). Eleven months later, the second-stage

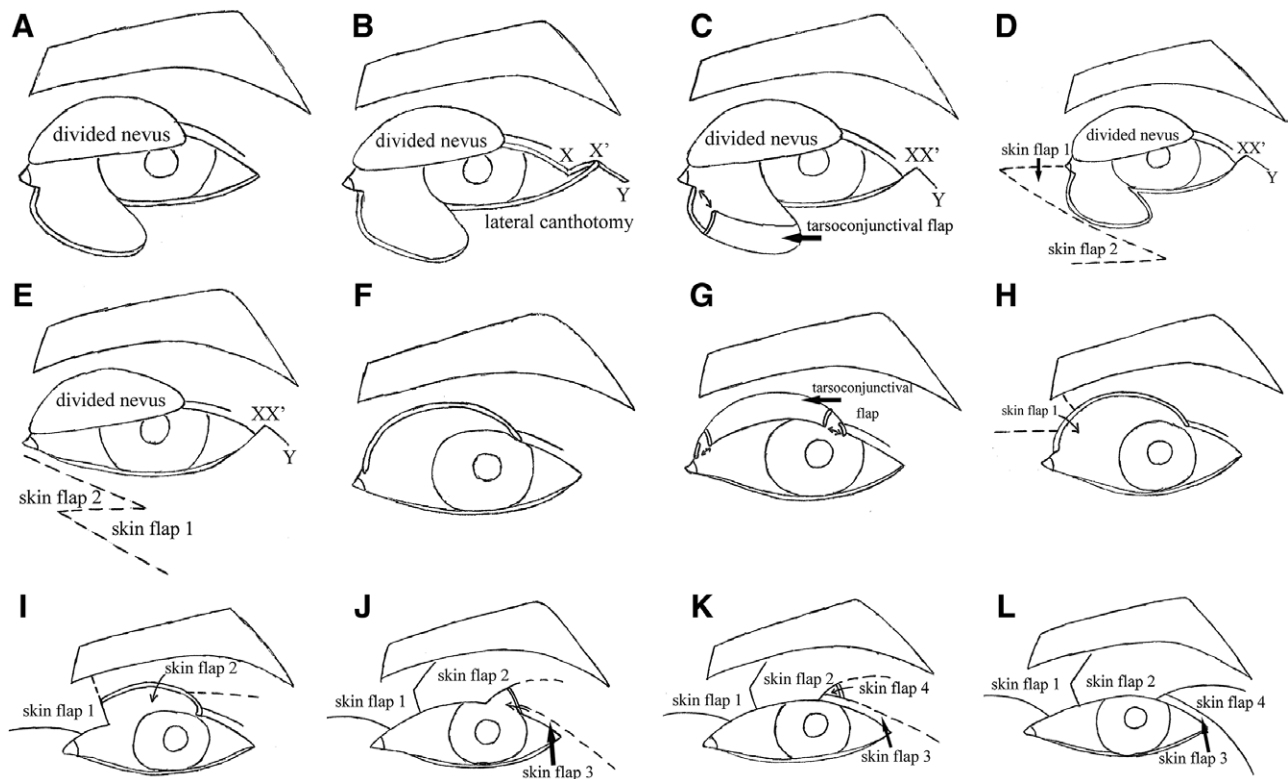
surgery was performed (Fig. 3C). The surgery began with total excision of the nevus of upper eyelid (Fig. 4F). Then, a downward displacement of tarsoconjunctival flap from the superior region and 4 pedicled skin flaps harvested from the nasal and temporal region were successively used to cover the defect of upper eyelid (Fig. 4G–K). The 4 skin flaps were pieced together, and the newly formed inferior border was trimmed (Fig. 4L). The surgery ended with the reconstruction of upper lateral canaliculus. The postoperative appearance was displayed (Fig. 3D). Histology confirmed the features were consistent with an intradermal type nevus (Fig. 3E, F).

### Case 3

A 26-year-old man was observed with a divided nevus on his left eyelid (patient 6). The nevus was 1.4×1.6 cm on upper eyelid and 1.5×1.7 cm on lower eyelid with irregular eyelashes in the formation [see Fig. 1, Supplemental Digital Content 1, which displays the divided nevus of a 26-year-old man (patient 6) in preoperative and postoperative images, <http://links.lww.com/PRSGO/A103>]. In the first-stage surgery, we performed a total excision with 1.0 cm of contiguous normal tissue on lower eyelid



**Fig. 3.** A, A divided nevus in a 28-year-old man (patient 2), occupying medial eyelids and lacrimal puncta. Extra attention should be paid to the patient because of recurrence after a previous tumorectomy and free skin grafting 10 years ago. B, Five days after the first-stage surgery. C, A photograph before the second-stage surgery and 11 months after the first-stage surgery. D, Three months after the second-stage surgery. E and F, The specimens of 2 surgeries both indicated intradermal type (original magnification ×10).



**Fig. 4.** Composite of line drawings (A–E) illustrated surgical procedures in the first-stage surgery and line drawings (F–L) illustrated surgical procedures in the second-stage surgery. A, The lower eyelid defect after resection of the nevus, which was around 1/2 of eyelid length. B, A lateral cantholysis to decrease surface tension. C, The tarsoconjunctival flap was slid medially and secured on the remaining medial tarsal edge after reconstruction of the lateral canthus. D, Three incisions were performed of a pair of z-flaps. E, The z-plasty flaps were reversed and secured into position. F, The upper eyelid defect after resection of the nevus, which was around 2/3 of eyelid length. G, The tarsoconjunctival flap was slid downward and secured to the remaining medial and lateral tarsal edges. H–K, Four skin flaps harvested from nasal and temporal regions were successively used to cover the cutaneous defect of upper eyelid. L, The 4 skin flaps were pieced together and the newly formed inferior border was trimmed. The dotted lines represent incisions of the skin.

(see Fig. 2, Supplemental Digital Content 2, which displays a composite of illustrated surgical procedures in the first and second stage of surgery, <http://links.lww.com/PRSGO/A104>). Because the lesion extended over the entire tarsus, the tarsus, tarsal conjunctiva, and cilia were excised. Meanwhile, we freed and advanced the remaining tarsal plate to rebuild the lower eyelid. Then, we made 2 oblique incisions to form 3 pedicled flaps. The anterior lamella of lower eyelid was completely reconstructed after the flaps were sutured into appropriate position (see Fig. 2, Supplemental Digital Content 2, which displays a composite of illustrated surgical procedures in the first and second stage of surgery, <http://links.lww.com/PRSGO/A104>). Finally, we directly closed the wound of donor sites and made a temporary tarsorrhaphy. The appearance 5 days after the surgery is shown. The patient was scheduled for the second-stage surgery 1 year later [see Fig. 1, Supplemental Digital Content 1, which displays the divided nevus of a 26-year-old man (patient 6) in preoperative and postoperative images, <http://links.lww.com/PRSGO/A103>]. The conspicuous remaining portion of the divided nevus on upper eyelid

was removed with 1.0cm of surrounding tissue. We repeated the surgical reconstructive procedures depicted above in the first-stage surgery after a lateral canthotomy, which provided the opportunity to advance the tarsoconjunctival flap. Finally, the skin flap harvested from temporal region was used to repair the cutaneous defect. This ceased the upper eyelid reconstruction (see Fig. 2, Supplemental Digital Content 2, which displays a composite of illustrated surgical procedures in the first and second stage of surgery, <http://links.lww.com/PRSGO/A104>). The patient was extremely satisfied with his physiognomy 3 months after the operation. Histological inspection of the divided nevi from the 2 surgeries both indicated intradermal types with active cellular proliferation in part of the region [see Fig. 1, Supplemental Digital Content 1, which displays the divided nevus of a 26-year-old man (patient 6) in preoperative and postoperative images, <http://links.lww.com/PRSGO/A103>].

## DISCUSSION

Due to the severe disfigurement, and potential malignant changes in divided nevus of the eyelids,

surgical treatment is recommended for all medium and large divided nevi.<sup>14,15</sup> Furthermore, Alfano et al<sup>16</sup> recommended full-thickness excision for even small-sized lesions. However, some surgeons have objections about this aggressive treatment because of the low rate of malignant transformations for small-to-medium divided nevi.<sup>17,18</sup> In consideration of the malignant transformation, unsettled cosmetics problems, and other pathological change after incomplete excision,<sup>19,20</sup> we insist that prophylactic complete surgical removal of the lesion is exceedingly important. In this study, the rapid change of the lesions in patients 1 and 5, the recurrent lesion in patient 2, and the postoperative pathologic examination of patients 1, 4, and 6 provide sufficient evidence for complete ablation. The most common complication after complete excision is eyelash sacrifice; however, this complication was negligible.

An additional issue in deciding the treatment course is the selection of adopting a 1- or 2-stage surgery. As intense wound contracture and subsequent deformity may occur when the lesions are removed in 1-stage operations,<sup>17</sup> it is an established fact that the operation does not need to be completed in a single step,<sup>21</sup> especially for medium (1.5–20 cm) and large (>20 cm) types. Besides, the palpebral fissure would be at risk of becoming shorter, and the arc of its natural curve would convert to a straight line if the surgery is accomplished in a 1-stage procedure. Furthermore, to control the surgery more effectively, surgeons should economize the slender superficial area of eyelid and avoid the formation of an oversized scar. According to our experience, the successive operations with an interval of at least 3 months are superior in restitution of scars and reutilization of regenerated skin.

The reconstruction of eyelid after excision remains a challenge because of its specialized function and cosmetic significance. Ideally, the reconstruction should provide a stable eyelid margin, protect the ocular surface, and sustain mobility.<sup>22</sup> In addition, any reconstruction must keep the symmetry between bilateral eyelids. A variety of reconstructive approaches have been employed before. Alfano et al<sup>16</sup> adopted autologous conjunctival epithelium to complete the conjunctival continuity. Free skin grafts harvested from the control lateral eyelid, postauricular, supraclavicular, and upper arm region have been the most common reconstructive approach. However, this method can lead to potentially worse donor-site morbidity and is more appropriate for white patients.<sup>1,13,23–25</sup> In Asian patients, free skin grafts could not reach satisfactory cosmetic result because of the apparent hyperpigmentation, different texture between the grafts and recipient site, and the conspicuous constriction of scars.<sup>26</sup> Thus, a more elaborate treatment is required for Asian patients. In our study,

patient 2 had lower cosmetic satisfaction with his previous surgery that repaired the defect with a free skin graft 10 years ago. The appearance of free skin graft was in discordance with recipient site in terms of color and texture (Fig. 3A). Thus, we used advanced skin flaps when designing the reconstructive procedures. Previously, distant pedicled flaps were used for medium-to-large divided nevi.<sup>27,28</sup> However, complications associated with this technique include venous obstruction, partial epidermal necrosis, and a larger donor-site “facelift” scar.<sup>2</sup> Accordingly, we propose free skin grafts, and distant pedicled flaps are emphatically not the best choice for medium-sized (1.5–20) divided nevi.

In contrast, we recommend advanced skin flaps combined with tarsoconjunctival flaps for this clinical conundrum in order to maximally recover the reduplicate functions of eyelids. Local skin flaps produce the best cosmetic outcome because of their identical physiological match with recipient sites in regard to the thickness, color, texture, and elasticity. In addition, because of the rich vascularity of eyelids, the subdermal vessels of eyelids are elongated and arranged parallel to palpebral fissure, which coincides with the long axis of advanced skin flaps.<sup>29</sup> Thus, necrosis of the local flaps rarely occurs. Moreover, the donor site can often be closed directly without secondary deformities.

In our research, the residual tarsus was reserved in 1/3 to 1/2 of horizontal length and more than 4 mm of vertical height of the eyelids after ablation of the lesions, which offers a scaffold for advanced tarsoconjunctival flaps and ensures the resultant eyelid margin stability.<sup>22</sup> It is noteworthy that the lateral cantholysis procedure is an effective “basic-cut” which allows medial movement of the tarsoconjunctival flap.

## CONCLUSIONS

In conclusion, the present research concentrates on surgical strategy for medium-sized (1.5–20 cm) divided nevus of the eyelids with an emphasis of using staged surgeries. The reconstruction procedures, including complete excision and advanced skin flaps combined with tarsoconjunctival flaps to repair the defect, may contribute to evolving treatment options for this hard problem. This surgical procedure is a reasonable treatment strategy that can yield satisfactory cosmetic results for medium-sized (1.5–20) divided nevus of the eyelids.

**Rong Lu, MD, PhD**

Zhongshan Ophthalmic Center  
State Key Laboratory of Ophthalmology  
Sun Yat-sen University

54 Xian Lie South Road, Guangzhou  
Guangdong 510060, People’s Republic of China  
E-mail: rongluzz@yahoo.com



## PATIENT CONSENT

*Patients provided written consent for the use of their images.*

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