



“Lid Switch Flap” for Subtotal Upper Eyelid Reconstruction: Where the Flap Pedicle and the Point of Rotation Should be Located

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Abstract

We report our experience using the “lid switch flap” for the reconstruction of large upper eyelid defects, emphasizing on the design, the point of flap rotation, and the detailed description of the surgical technique. From 2018 to 2021, three patients with squamous cell carcinoma (SCC) invading 50 to 70% of the upper eyelid underwent tumor excision. The defects were reconstructed using the two-stage “lid switch flap” method. At the first stage, the “switch flap” from the lower eyelid was designed medially based preferably, elevated and “switched” to the defect, whereas the pedicle was divided at the second stage in 2 to 3 weeks. The mean of defect widths after tumor excision (D) was 23.6 mm (range: 18–29 mm) and the mean of widths of lid switch flaps (F) was 15.3 mm (range: 10–20 mm), and thus, the mean of F/D ratio was 0.63 (range: 0.55–0.69). The histopathology report confirmed the complete excision of the SCCs. The patients were followed up for 2 years. The functional and aesthetic results were excellent.

Keywords

- ▶ lid switch flap
- ▶ upper eyelid reconstruction
- ▶ squamous cell carcinoma

Level of Evidence Level II, therapeutic study.

Introduction

We report our experience using the “lid switch flap” for large defects of the upper eyelid, emphasizing on the design of the flap base and the point of flap rotation.

Patients and Methods

From 2018 to 2021, three patients with squamous cell carcinoma (SCC) invading 50 to 70% of the upper eyelid (▶ **Fig. 1A, B**) underwent tumor excision (▶ **Fig. 2A, B**), and the defects were reconstructed using the two-stage “lid switch flap” method.

Surgical Technique

We designed the flap making its width smaller than that of the defect. The size of the flap was half up to two-thirds of that of the defect, depending on the skin laxity of the lower eyelid. A decision was made with regard to the location of the pedicle base and whether this should be medially or laterally. The decision was based mainly on two criteria: the extent and the location of the defect. We preferred the medially based flap in all cases. The point of rotation of the flap at the lower eyelid, which it also defined one of the lateral borders of the flap, was determined by adding one-third of the width of the defect to the edge of the defect at the selected side of flap pedicle (▶ **Fig. 3**). The flap incision at the pedicle site

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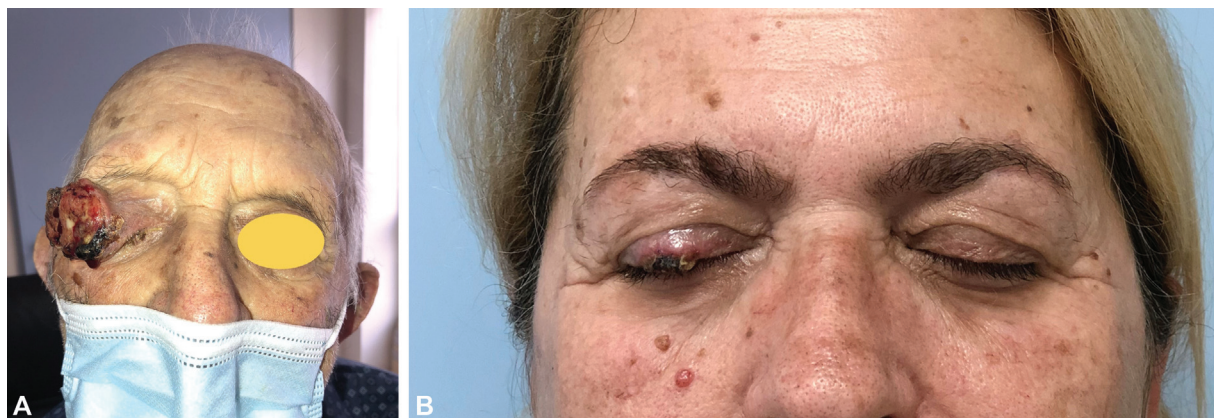


Fig. 1 (A) Squamous cell carcinoma (SCC) invading almost 70% the right upper eyelid of a 87 years old patient. (B) SCC invading almost 65% the right upper eyelid of a 64 years old patient.

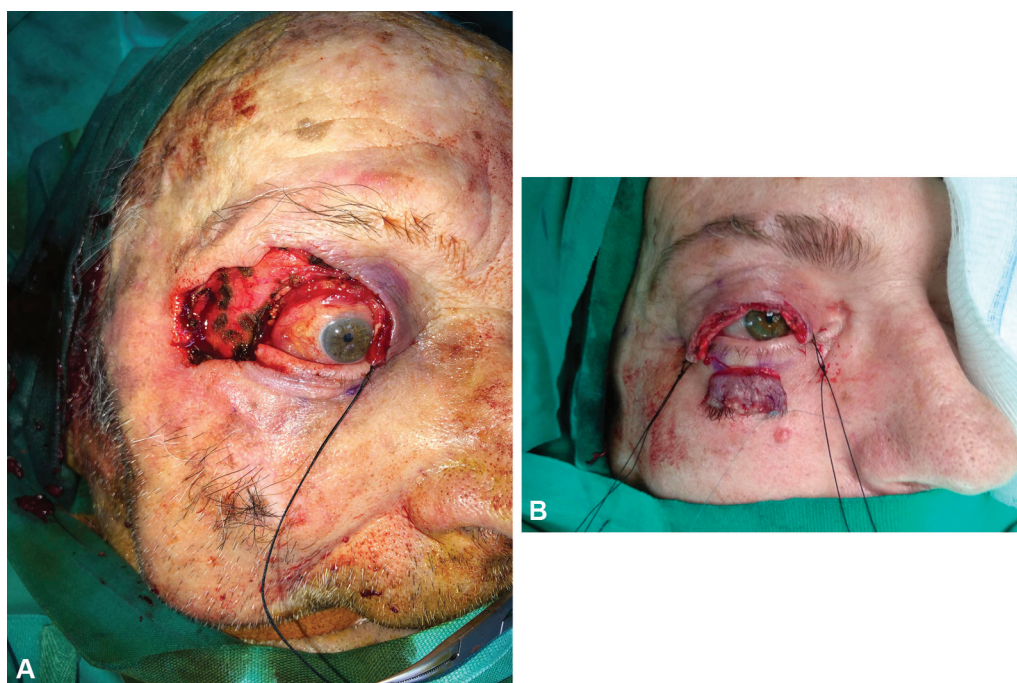


Fig. 2 (A) The first patient underwent large excision of the lateral canthal area including the lateral part of the lower eyelid in addition to the excised part of the upper eyelid. (B) The second patient underwent large excision leaving a defect of 65% approximately of the upper eyelid width.

stopped 5 mm approximately from the lid margin to avoid injury to marginal vessels, which lie 3 mm from the free lid margin. The lower lacrimal punctum was preserved and the medial canthal area left undisturbed.¹ The height of the flap at the anterior lamina should be the same as that of the defect, but at the posterior lamina up to the conjunctival fornix.² The flap was “switched” to the defect and sutured in layers (► Fig. 4). At first, we inserted a single 5.0 nylon or silk suture at the gray line on either segment (intermarginal strip of the flap and upper eyelid segment), to give accurate apposition of the upper lid margin. The conjunctiva both of the flap and defect were stitched together as possible with 6.0 polyfilament absorbable suture. The lower eyelid retractors and orbicularis muscle included in the flap were sutured to the remaining part of the levator aponeurosis at the upper eyelid as wide a distance as possible with 5.0 polyfilament

absorbable suture. The skin of the flap was sutured to the skin of the upper eyelid with interrupted 6.0 non-absorbable synthetic sutures. For reconstruction of the lower eyelid, lateral cantholysis, orbito-cheek rotation flap, and chondromucosal graft were performed. The upper and lower eyelids were sutured together temporarily to protect the switch flap and the cornea, and thus to avoid flap problems and corneal irritation. The pedicle of the “switch flap” was divided at a second stage in 2 to 3 weeks (► Fig. 5).

Results

The specimens were sent for frozen section and the histopathology confirmed the complete excision of the SCCs with adequate margins (4–5 mm). The upper eyelid opening and levator function were satisfactory, whereas the aesthetic



Fig. 3 “Lid switch flap”: schematic representation of the design.

results excellent. The mean of defect widths after tumor excision (D) was 23.6 mm (range: 18–29 mm), involving 50 to 70% of the eyelid, and the mean of widths of lid-switch flaps (F) was 15.3 mm (range: 10–20 mm). Thus, the mean of F/D ratio was 0.63 (range: 0.55–0.69; ► **Table 1**). Minor revision was performed in one case (patient no 2) to improve the aesthetic features of the “new” upper eyelid margin. No complications were documented. There were neither ectropion and/or entropion of the upper or lower eyelid nor corneal irritation. The patients were very satisfied with the outcome. They were followed up every 4 to 6 months for up to 2 years and remained free from the disease, with no signs of recurrence or functional deficit.

Discussion

The procedures for reconstruction of large upper eyelid defects are either bridging or nonbridging.³ Nonbridging techniques generally use a graft to reconstruct the posterior lamella, and a locoregional skin flap for the anterior lamella. They are one stage procedures not occluding the eye, but are associated with unfavorable outcomes. In bridging techniques, a flap is brought up from the ipsilateral lower eyelid occluding the visual axis, until a second stage procedure is performed where the bridge flap between the two eyelids is divided. The bridging techniques are the procedures of choice for the reconstruction of large upper eyelid defects and include the “Reversed Hughes” procedure, Cutler-Beard procedure,⁴ and Mustarde lid switch flap. The “switch flap” was originally described by Mustardé⁵ and despite minor disadvantages of corneal irritation, it has been associated with clear functional and aesthetic advantages over the other techniques and especially the Cutler-Beard technique: the time period of the eye occlusion is less and the full-thickness flap from the lower eyelid including orbicularis oculi muscle and tarsus creates a more stable lid, allowing for incorporation of an intact eyelid margin that includes the eyelashes.



Fig. 4 The flap switched and sutured carefully at the upper eyelid and a cheek rotation flap was employed to reconstruct the lower eyelid.

This article provides a detailed description of the surgical technique, emphasizing on the design, the flap dissection and especially the inset and suturing techniques at the first stage. Although the sample size was small, we would like to share our experience with these challenging cases. There are two critical issues: the flap base and point of rotation. These criteria determined exactly where on the lower eyelid the switch flap should be taken from. We think that for large defects more than 50% of the width of the upper eyelid, the “switch flap” should be medially based preferably, and an orbito-cheek rotation flap can be raised for lower eyelid reconstruction. That choice had several advantages. The “switch flap” pedicle differed from the pedicle of orbito-cheek rotation flap, the flap was smaller and could be handled easier, safeguarding the flap survival. The lid flap was “switched,” inset and sutured better to the upper eyelid with less tension and traction. Furthermore, the lower lacrimal punctum, canaliculi, and overall dynamic lacrimal pump mechanism were better preserved. However, if the defect includes the medial part of upper eyelid and canthal area, then a laterally based flap should be raised. The point of rotation of the flap was important as it determined the flap dimensions aiming to preserve “more” lid at the lower eyelid. The “lid switch flap” needs to be at least 4 mm wide to include the marginal arcade, and it is usually one-half to two-thirds of the upper eyelid defect.⁶ The flap should be switched and sutured as much as possible to the defect at the first stage meticulously. The size of the flap depends on the laxity of the lower eyelid skin and the size of the defect. In the advanced age group and elderly, the tissues are much more lax and the flap size half of the defect size or slightly larger might be enough, but for younger patients the flap size should be larger up to two-thirds of the upper eyelid defect. In our study, the mean of defect widths after tumor

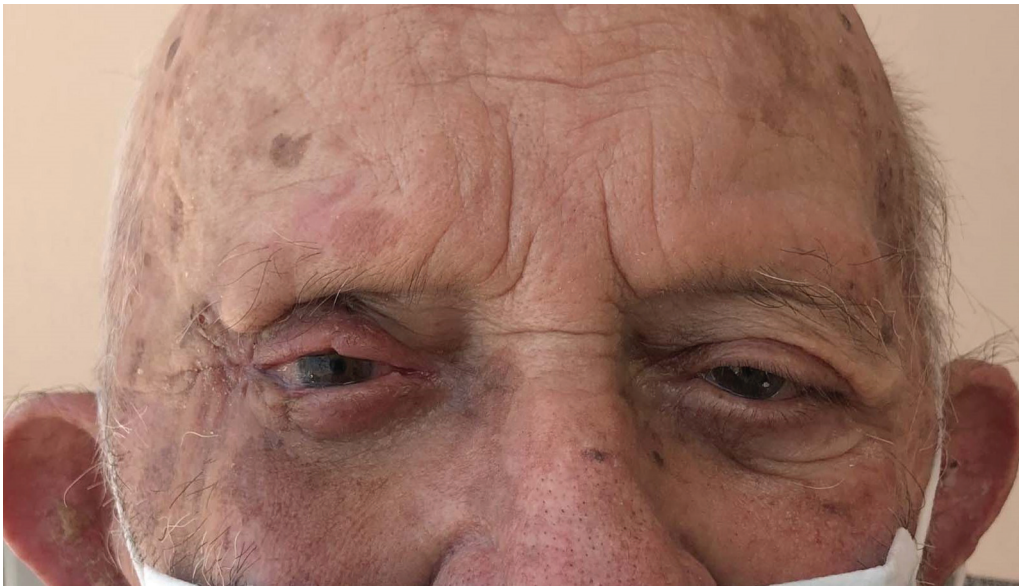


Fig. 5 The pedicle of the “switch flap” was divided at a second stage in 3 weeks.

Table 1 Demographics—reconstructive features

Patient no	Age	Sex	Upper eyelid	Tumor	Defect (D) (mm)	% of upper eyelid involvement (approx.)	Flap width (F) (mm)	F/D
1	87	M	R	SCC	29	70	20	0.69
2	64	W	R	SCC	24	65	16	0.66
3	72	M	R	SCC	18	50	10	0.55
					Mean: 23.6		Mean: 15.3	Mean: 0.63

Abbreviations: approx., approximately; D, defect; F, flap; M, man; R, right; SCC, squamous cell carcinoma; W, woman.

excision (D) was 23.6 mm, and the mean of widths of lid switch flaps (F) was 15.3 mm, and thus the mean of F/D ratio was 0.63 (range: 0.55–0.69) that falls within the suitable range of 0.5 to 0.66 for the switch flap method. An orbito-cheek rotation flap was employed to reconstruct the lower eyelid. Minor differences such as the length of the “new” upper eyelid may occur, depending on the defect-flap size and healing process. Our patients reported that initially they felt somewhat uncomfortable during the time interval between the 1st and 2nd stage.

However, they all were extremely pleased with the outcome. Although we did not use any score, the patients were simply asked to evaluate the function and the aesthetic appearance of the “new” upper eyelid, judging from poor, satisfactory, good, and excellent. They all reported verbally an excellent outcome. Postoperative pictures have shown that the flap usually settles gradually within 3 to 4 months (► Fig. 6A, B).

The advantage of the “lid switch flap” is its safety, and should be performed in an experienced way. The two-stage

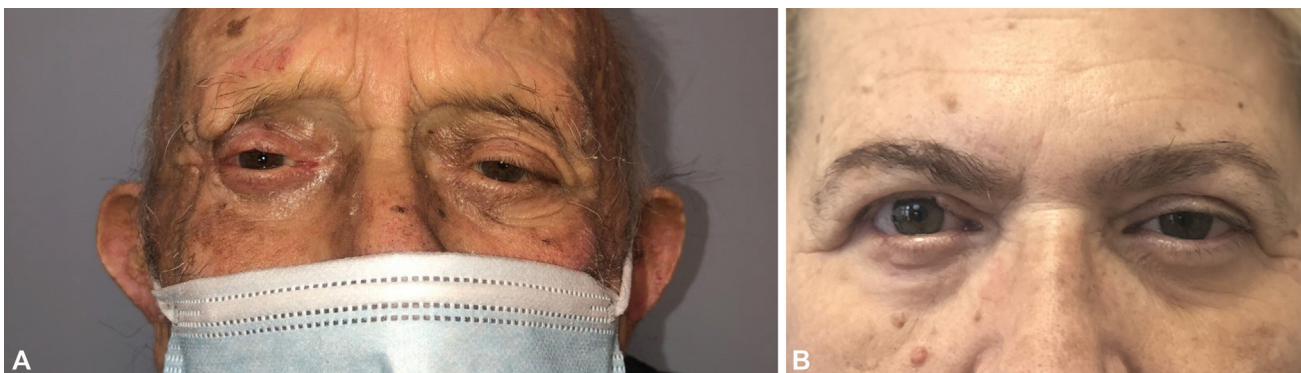


Fig. 6 (A, B) Postoperative pictures at subsequent follow-up have shown that the flap usually settles gradually within 3 to 4 months. There were neither ectropion and/or entropion of the upper or lower eyelid nor corneal irritation. The patients were very satisfied with the outcome.

procedure offers a better vascularity at the first stage and more trimming and refined reconstruction at the second stage, for an excellent aesthetic and functional outcome.

Informed Consent

The authors confirm that written and oral informed consent for patient information and images to be published were provided by the patient in the photographs. Furthermore, the patients' features were not identifiable and therefore the patients' anonymity was maintained throughout the whole text.

Conflict of Interest

None declared.

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