



## Wide Excision of Eyelid Tarsus with Superficial Lamellar Lid Margin Tarsus Excision for Palpebral Conjunctival Melanoma

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### Abstract

Conjunctival Melanoma (CM) rarely occurs in the Chinese population. It is found more often in the non-bulbar area with worse prognosis compared with Caucasians. No consensus is reached regarding the standard surgical treatment of palpebral CM. We presented a 39-year-old Chinese female who developed CM at her right eye, involving superonasal palpebral conjunctiva, superonasal bulbar conjunctiva and medial caruncle. We excised the lesion including underlying Tenon capsule and the main part of underlying tarsus with a maximum clear margin of 4 mm, while sparing the tarsus of the eyelid margin. We applied a hemi-depth lamellar incision on the eyelid margin tarsus to preserve the contour of eyelid. Double freeze-thaw cryotherapy was applied to the excision margin, and the conjunctival deficit was closed by an amniotic membrane graft. We provided post-operation adjuvant chemotherapy with 0.02% Mitomycin C three times daily for a schedule of three weeks on, one week off. Good cosmetic outcome was achieved with no recurrence in the following 35 months. Tarsus is important in lid function and for aesthetic appearance. To achieve wide-enough safety margin and intact eyelid contour, we presented a new simple approach with good cosmetic outcome and desirable disease control in palpebral CM surgery.

**Keywords:** Blepharoplasty; Conjunctival neoplasms; Melanoma

### Key Messages

Non-bulbar conjunctival melanoma is associated with poor prognosis especially in the Chinese population. The wide excision with external lamellar lid margin tarsus sparing was a simple approach that yielded good cosmetic outcome and desirable disease control.

### Introduction

Conjunctival Melanoma (CM) is a rare and highly recurrent malignancy that primarily affects old Caucasians in their 60s. CM annual age-adjusted incidence rates (1 million person years) for different races were 0.49 for non-Hispanic Whites, 0.18 for Blacks and 0.15 for Asians [1]. Bulbar conjunctiva is the most common site of CM, affecting 60% to 92% of cases, and half of them involving the limbus [2]. CM in Chinese patients, with 70% to 95% of them invading non-bulbar area, leading to a poorer prognosis [3,4]. Surgical treatment for bulbar melanoma has long been reported, but little has been discussed on the aspect of reconstruction related to palpebral conjunctival melanoma. Cases reported are mainly limited to those undergoing tarsoconjunctival graft [5], Hughes tarsoconjunctival flap [6] and total-tarsus-sparing surgery [7]. Here, we demonstrated a novel and relatively simple surgical approach for treating palpebral CM. This surgical method achieves wider safety margin without grafting, prevents donor-induced wound on donor site, as well as a good aesthetic appearance.

### Case Presentation

A 39-year-old Chinese female with no systemic disease presented with a pigmented lesion at the superonasal palpebral conjunctival of her right eye (Figure 1). The lesion existed since her age of 32 years, and enlarged progressively over the recent two months. There were no associated

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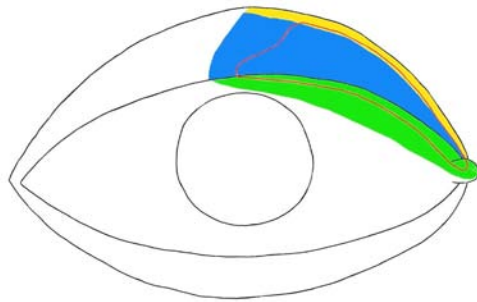
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**Figure 1:** Large nodular conjunctival melanoma involving superior palpebral conjunctiva, superior fornix, caruncle and superior bulbar conjunctiva over right eye. The eyelid margins are spared. No feeding vessel is seen.



**Figure 2:** Diagrams to illustrate the surgery design. The melanoma invaded palpebral, forniceal, bulbar and caruncle area (red line). We excised the bulbar conjunctival lesion including the underlying Tenon capsule (green block), as well as palpebral conjunctival lesion with full thickness of the tarsus underneath melanoma (blue block). The conjunctival lesion within two millimeters superior to lid margin was excised with hemi-depth lamellar tarsectomy (yellow block).

complaints related to the central nervous system, chest or abdomen. On examination, an elevated dark-brown lesion measuring 15 mm in size was located at 12 o'clock to 3 o'clock area of right palpebral conjunctiva, invading caruncle, superior fornix and superior bulbar conjunctiva. The lesion was close to but did not invade the eyelid margin. Her visual acuity was 6/6.7 OD and 6/5 OS. Other ophthalmic examinations including those of the anterior chamber and B scan were all unremarkable. No palpable lymphadenopathy was detected over the submandibular, cervical, preauricular and parotid areas. The patient's systemic work-up including general physical examination, chest X-ray, abdominal sonography, brain MRI and Positron Emission Tomography (PET)/CT were also unremarkable.

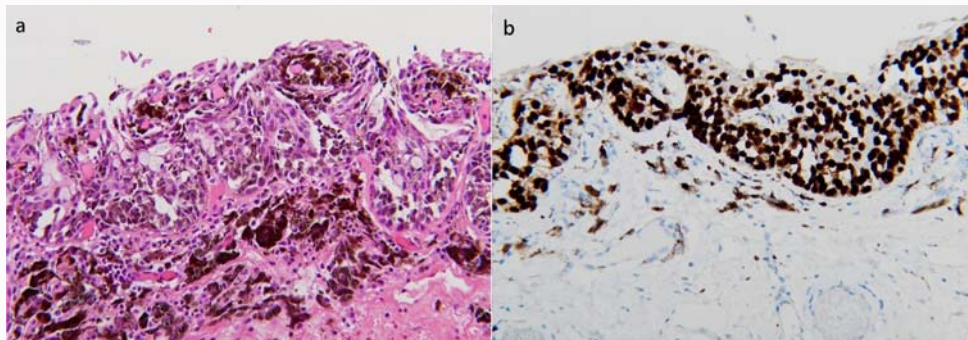
We performed a wide local excision with a planar clear margin



**Figure 4:** Post-operation clinical appearance of the patient's eyes. Note the contour of right upper eyelid is intact with good cosmesis.

of 4 mm as much as possible. It started from the superior palpebral conjunctiva to the superior bulbar conjunctiva, including caruncle and superior fornix. We excised deep to the underlying Tenon capsule and tarsus, while sparing the external hemi-depth lamellar tarsus of superior eyelid margin, which was 2 mm superior to eyelid margin, to preserve the function of eyelid with enough safety margin (Figure 2). Double freeze-thaw cryotherapy was applied over the conjunctival excision borders and the base of palpebral conjunctival excision site. The residual conjunctival defect was closed with an amniotic membrane graft, using a second set of instruments to avoid contamination. The symblepharon ring was inserted in place. The final histopathology revealed malignant melanoma arising from Primary Acquired Melanosis (PAM) with moderate atypia, with microinvasion <1 mm. The Breslow thickness was less than 1 mm. The resection margin was free of tumor but less than 1 mm in distance to the peripheral and deep margin (Figure 3). Lymph-vascular invasion and perineural invasion were not identified. The final clinical staging was cT2cN0M0, according to the American Joint Committee on Cancer Staging Manual (8<sup>th</sup> edition) [8].

The patient appeared unable to tolerate the symblepharon ring and symblepharon with shallow upper fornix was observed. We reconstructed, 7 weeks after primary surgery, a superior fornix with a contralateral conjunctival graft. No obvious syndromes of dry eye for diplopia were noted after surgery. Topical adjuvant chemotherapy was applied considering the higher recurrence risk related to pagetoid pattern of pathology. We started the patient on topical chemotherapy



**Figure 3:** Histopathology of the lesion. These atypical melanocytes presented with pleomorphic nuclei, small polyhedral cell, radial spread of the intraepithelial component and pagetoid growth. A) Hematoxylin and eosin stain, x200; B) SOX-10 immunohistochemistry staining, x200.

one week after the fornix reconstruction, allowing the wound to heal. The three-week course of topical chemotherapy was followed by one-week of rest and repeated for 12 cycles. Follow-ups of 35 months showed no recurrence of melanoma with good cosmetic outcome (Figure 4).

## Discussion

About the surgery for conjunctival melanoma, the "no touch" surgical technique was firstly described by Shields et al. [9] and was widely accepted. Wide excision and reconstruction with clean instruments can prevent the tumor from recurrence and metastases related to inadequate surgical treatment or iatrogenic seeding. The excision of underlying Tenon capsule in bulbar CM is widely performed, and lamellar scleral dissection is suggested if the Tenon capsule is involved or scleral adhesion [10]. In our case, the underlying Tenon capsule was not involved, so we did not perform lamellar scleral dissection.

Different from bulbar conjunctiva, which is loosely attached to the sclera by the Tenon capsule, the palpebral conjunctiva adheres firmly to the tarsus. In palpebral CM, posterior lamellar eyelid resection is often conducted. The defect of tarsus and conjunctiva can be repaired by the Hughes technique or nasal cartilage with mucous membrane [11]. Some may excise the conjunctival lesion only with tarsus sparing to preserve the eyelid function [7]. If the lesions extend onto the eyelid margin or skin, a full thickness eyelid resection is required. In our case, the melanoma invaded both bulbar and palpebral conjunctiva with eyelid margin sparing. We excised the posterior lamellar of eyelid, namely the conjunctiva and the full-thickness of tarsus underneath the palpebral CM, and performed the superficial lamellar tarsal excision at the eyelid margin, leaving hemi-depth of residual tarsus to preserve the normal eyelid contour. The surgical technique in this patient created a larger safety margin than total-tarsus-sparing procedure and was much simpler in reconstruction compared with conventional posterior lamellar eyelid resection due to no need of grafting. A good functional and aesthetic outcome was achieved with no tumor recurrence in 35-month follow-up.

Post-operative adjuvant therapy is also important in treating conjunctival melanoma. Topical chemotherapy such as mitomycin C is widely used. There is no recommended dose and treatment cycle duration, but the convention is 0.04% mitomycin C four times a day for 1 to 3 weeks, followed by 1-week rest or topical steroids [2]. In addition to mitomycin C, others use interferon alpha-2B as an alternative due to its fewer adverse events. Brachytherapy is another adjuvant treatment and has effects on sclera, deeper than the topical mitomycin C. For extensive tumors, proton radiotherapy is used after excision and conjunctival mapping if patients refuse exenteration. At present, no effective systemic treatment is available for CM. Recent studies reported benefits of immunotherapy of CM using checkpoint inhibitors (like nivolumab or pembrolizumab) [12]. In view of the high similarity between cutaneous melanoma and conjunctival melanoma, the efficacies of BRAF/MEK inhibitors are also being evaluated [13]. We prescribed 0.02% mitomycin C three times daily instead of 0.04% regarding that higher dose was related to limbal stem cell failure in some cases. Our patient went through topical chemotherapy well and showed no melanoma recurrence in the following 35 months.

For CM, prognostic factors include tumor location, tumor thickness, and its origin and histopathology findings. Bulbar melanoma's outcome is better than those involving other sites, like limbus, cornea, fornix, palpebral conjunctiva and caruncle. Tumors

>2 mm thick (as measured from epithelial surface to the substantia propria involved) have higher stagings and poorer prognosis [8]. De novo melanoma develops metastasis and mortality worse than those arising from nevi or PAM with atypia. Histopathology involving epithelioid cells, pagetoid growth, absence of inflammatory response and lymphatic invasion are associated with a poor prognosis [14]. In our present case, the tumor was located at palpebral conjunctiva, which is a site with unfavorable outcome. The pathology with pagetoid growth is also associated with poorer prognosis. Apart from the above conditions, our patient's tumor originated from PAM and was <2 mm thick, both of which are associated with a better outcome.

Very few case reports and series of CM are available for Chinese and other Asians. Compared to Caucasians, Chinese patients tend to have poorer prognosis with the younger population, with more cases of de novo origin, or located at the non-bulbar area, showing multifocal lesions, more metastases and tumor related deaths [4]. Another study on Asian Indians showed the same trend of younger patients, more de novo in origin, and metastasis rate higher than Caucasians, but with fewer local recurrences and more incidents of bulbar melanoma [15].

## Conclusion

CM in Chinese is found more often in the non-bulbar area with poorer prognosis compared with Caucasians. There are very few studies on the treatment and reconstruction of palpebral CM. We here reported a new and simple surgical technique that achieved good disease control without grafting and donor site wound, as well as desirable cosmetic results. More cases and longer follow-up periods are needed to assess long-term outcomes.

## Ethical Approval Statement

All procedures performed in studies involving human participant were in accordance with the ethical standards of the institutional and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Institutional review board approval: TCVGH-IRN No.CE21167A.

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