



The Successful Treatment of Eyelid Intradermal Melanocytic Nevi (Nevus of Miescher) With the Dual-Wavelengths Copper Vapor Laser

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Abstract

Introduction: Surgical methods for removing eyelid nevus are associated with a risk of developing such side effects as scarring or loss of eyelashes. Although current laser modalities have shown promising results, eyelid laser surgery may cause skin discoloration and noticeable scarring. This study aims at evaluating the efficacy and safety of the dual-wavelengths copper vapor laser (CVL) treatment of eyelid intradermal nevus of Miescher (NM).

Patients and Methods: We present three adult female patients with eyelid intradermal nevus treated with CVL. CVL settings were as follows: the average power of 0.6-0.8 W, under a power ratio of 3:2 at wavelengths of 511 nm and 578 nm, exposure time of 0.3 seconds, the light spot diameter of 1 mm.

Results: The dual-wavelength CVL treatment of medium- and large-sized NM provides the complete removal of eyelid dome-like NM after one and two sessions with a month interval correspondingly. The duration of skin healing accounted for two weeks.

Conclusion: The complete removal of eyelid NM lesions without side effects demonstrates the safety and efficacy of dual-wavelengths CVL in treating such skin lesions. This laser treatment mode of benign skin neoplasms seems promising for dermatologists and cosmetologists' clinical practice.

Keywords: Intradermal melanocytic nevus; Eyelid Miescher nevus; Copper vapor laser; Laser treatment; Periorbital laser treatment



Introduction

Intradermal melanocytic nevi present a benign skin tumor. Clinically recognizable dome-shaped smooth eyelid intradermal nevi are referred to as nevus of Miescher (NM).^{1,2} Dome-shaped intradermal eyelid nevus (IEN) located on the inner area of the ciliary edge of the eyelid predisposes to eyelid dysfunction, defective blinking, and the coning of vision. Previously surgical excision of the involved area was considered the only treatment mode for removing IEN.³ Surgical excision in the eyelid ciliary edges is especially difficult because the thickness of the epidermis does not exceed 50 microns, and the depth of the dermis is about 300 microns.⁴ Eyelid NM treatment choice requires special care since non-selective removal technologies (for example, the radio wave and CO₂ ablation) can lead to scar formation and severe functional complications in the organ of vision.⁵ As an alternative to tissue excision in the NM region, attempts were made to remove the pathological focus using laser treatment. Until recently, near-infrared lasers (ruby, alexandrite, Nd:YAG)

were used for this purpose.⁶ The near-infrared radiation is poorly absorbed by the melanin compared with the visible range, penetrates to a greater depth into the tissue, and requires higher light doses for the selective heating of melanosome in nevi.⁷ Its use is associated with the risk of periocular side effects in edema, vitreous and iris damage, eyelash loss and even partial loss of vision.^{8,9} Moreover, special corneal metal plates (shields) do not eliminate the risk of damage to the eye.^{8,9} The high risk of side effects determines the search for more relevant laser technologies for its treatment.

The copper vapor laser (CVL) radiation at wavelengths of 511 and 578 nm provides the most effective and safe laser treatment for skin pigment lesions.¹⁰ CVL radiation can be applied safely in the eyelid area due to high absorption by melanin, oxyhemoglobin, and hemoglobin.¹¹

This case series presents the experience of removing medium- and large-sized eyelid NM using dual-wavelengths CVL radiation.

Case Presentation

Three fair-skinned females with Fitzpatrick skin type II, aged 31, 33, and 65 years, with medium and large-sized NM located inside of the ciliary edge of the eyelid, presented complaints due to a cosmetic defect and the risk of limiting the visual field because of the pronounced increase in the size of the involved eyelid area. All lesions looked like dome-shaped smooth neoplasms with the broad base, sized from 5 mm to 15 mm in length and 3 to 6 mm in height (Figures 1-3 A). Eyelid neoplasms appeared at the beginning of puberty and increased in size with age. The family history of the patients was negative for melanoma. The patients were diagnosed according to a clinical examination and dermoscopy findings. No biopsy was taken for the diagnosis.

Photographs were taken in frontal projection and were standardized in lighting and positioning. The eyelid NM was removed with CVL radiation.

All treatments were performed using the CVL, Yakhroma-Med, developed at the P.N. Lebedev Physics Institute, RAS. CVL provides dual-wavelength radiation

with a power ratio at wavelengths of 511 nm and 578 nm at 3:2. Laser settings were as follows: average power accounted of 0.6 - 0.8 W, the exposure time was set as – 0.3 seconds. The diameter of the light spot on the skin was 1 mm. The distance between the centers of the adjacent light spots was 1 mm. The laser treatment took a single session. Eye protection was provided by stainless steel (corneal) eye shields positioned on the surface of the orbit after applying a topical ophthalmic local anesthetic. The patient was placed in the supine position and the surgeon stayed behind the patient's head. The treatment was performed according to a multiple-stacking-pass technique. The treatment endpoint was accepted when all the nevus area become grey. For medium NM, a single treatment was sufficient (Figures 1-3 B). In the case of a large-sized NM, the second treatment was performed at the same settings with an interval of 1 month.

The patients tolerated laser therapy satisfactorily, with no anesthesia required. The treatment was stopped after the treated area acquired a grayish tint. After laser exposure, 0.3% Floxal eye ointment was applied to the skin. In the early postoperative period, 0.3% Floxal ophthalmic ointment was applied to the laser-treated area three times a day. The healing process lasted 12 days. All patients were followed up for 24 months after the last laser treatment.

Results

Immediately after laser treatment, the color of the eyelid NM area acquired a grayish tint, which persisted for several days. The crusts were separated with the epidermis restoration after 7-10 days without hyperpigmentation on the treated area. Two weeks after the laser procedure, the skin color became similar to the adjacent intact skin color without scarring. The dual-wavelength CVL treatment of eyelid NM made it possible to restore normal skin color without relapses throughout the entire follow-up period of 2 years. No side effects were observed after the procedure (erythema, bleeding) or prolonged long-term side effects (scarring or repeated pigmentation) (Figures 1-3 B).

Discussion

The successful treatment of eyelid NM using dual-wavelengths CVL radiation allows this laser treatment mode to be optimal. Different laser systems and their combinations have recently been used with varying success to treat eyelid NM.¹² Ablative lasers (CO₂ and Er:YAG) have shown promising results, but side effects and relapses have been reported.⁵ Near-infrared lasers (ruby, alexandrite, Nd:YAG) are dangerous in the periocular region. Mid-IR laser radiation has high penetration depth and can cause ocular injuries.^{8,9,12-14} High absorption of CVL radiation by melanin, oxyhemoglobin, and hemoglobin determines the safety of laser treatment of the skin eyelid lesions. The effective penetration

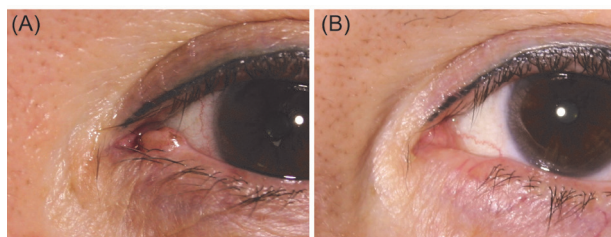


Figure 1. 31-Year-Old Female With NM, 5 mm in Diameter, in the Area of the Lacrimal Canal (A) - Before the Treatment, 6 Months After the Treatment (one procedure was performed) (B).

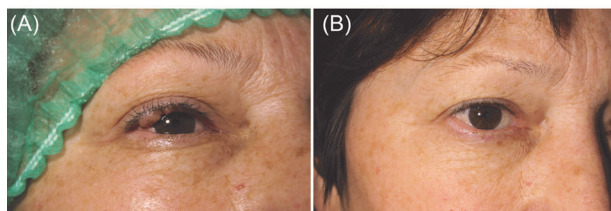


Figure 2. 43-Year-Old Female With the Upper Eyelid NM, 15 mm in Length and 5 mm in Height (A) - Before the Treatment, 1 Month After the Treatment (one procedure was performed) (B).

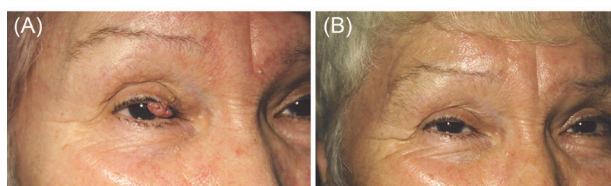


Figure 3. 65-Year-Old Female With the Upper Eyelid NM, 17 mm in Length and 6 mm in Height (A) - Before the Treatment, 2 Months After the Treatment (two procedures were performed) (B).

CVL depth does not exceed the thickness of the eyelid dermis.^{4,11} Nevomelanocytes induce hypoxic endothelial dysfunction in the microvessel NM-involved area. The prevention of the recurrence of nevomelanocytosis of the dermis requires the remodeling of the microvascular bed near the NM-involved area.^{15,16}

CVL yellow radiation provides selective photodestruction of the microvascular bed in the eyelid NM area. It prevents bleeding during the procedure and the recurrence of the NM-involved area.^{10,17}

Conclusion

Dual-wavelengths CVL radiation provides effective treatment of NM without side effects. Additional research needs to determine the optimal green/yellow ratio of CVL power for different eyelid skin lesions bearing certain features of the patient eyelid NM.

Conflict of Interests

The authors would like to state that they do not have any conflict of interests to disclose.

Ethical Considerations

Written informed consent was obtained from the patients before the treatment.

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