·Clinical Research·

Simple keratectomy and corneal tattooing for limbal dermoids: results of a 3-year study

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Abstract

• **AIM: To evaluate and report the efficacy of combined surgical excision and corneal tattooing in patients with limbal dermoids.**

• **METHODS: In a retrospective interventional case series, 9 eyes of 8 patients were treated with combined surgery of simple keratectomy and corneal tattooing for limbal dermoids. Medical records, including best-corrected visual acuity, anterior segment photography, demographic, clinical data, and follow-up information were reviewed.**

• **RESULTS: The mean follow up period in this study was 50±15 (range 36-77) months. There was no evidence of infection or recurrent limbal dermoids in any of the eyes during the follow-up period. All patients achieved good cosmetic outcomes with no complications.**

• **CONCLUSION: Simple keratectomy and corneal tattooing of limbal dermoids could be an alternative option for surgery, especially when a donor cornea is not available.**

• **KEYWORDS:** corneal tattooing; limbal dermoid; simple keratectomy
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INTRODUCTION

A limbal dermoid is a congenital benign choristoma composed of tissues of ectodermal and mesodermal origin. It occurs most commonly in the inferotemporal quadrant as a solitary lesion, but occasionally occurs as multiple lesions [1,2]. The typical morphology of a limbal dermoid is an elevated yellow or white round mass overlying both the cornea and conjunctiva. The growth rate of these masses is very slow or even stationary[2].

There are two ways to consider clinical problems associated with limbal dermoids: cosmetic and functional. Firstly, these lesions do not always affect vision, but patients may want treatment for cosmetic reasons. Although Kaufman *et al*[3] stated that cosmetic issues should not be an indication for surgery, others insist that cosmetic problems can affect the quality of life of patients. Secondly, limbal dermoids associated with lipid keratopathy can decrease visual acuity, especially when the visual axis is occluded. Furthermore, they can evoke corneal astigmatism. The pathogenesis is thought to involve intrinsic changes in the corneoscleral wall structure, and can result in instability of the tear film[4].

The conventional method of treatment for dermoids is a simple excision or a shaving operation. However, complications including postoperative scars with neovascularization or pseudopterygium have been frequently noted [5]. Lamellar keratoplasty appears to be an alternative method with a lower complication rate compared to simple excisions [4]. However, lamellar keratoplasty also has disadvantages, such as the need for a donor cornea, and the possibility of rejection, infection, induced astigmatism, and complications after long-term use of corticosteroid or immunosuppressive agents[6].

In the present study, we report on cases of patients who underwent simple excision and corneal tattooing in order to demonstrate that these treatments can be appropriate substitutes for lamellar keratoplasty in some instances. We also evaluated the efficacy and possible complications of this new technique.

SUBJECTS AND METHODS

Subjects A retrospective chart review was conducted on 9 eyes of 8 patients who underwent simple excision and corneal tattooing from March 2005 to August 2008 in our hospital. This study was initiated after having been approved by the appropriate institutional review board. All patients were referred to our clinic for cosmetic improvement. A thorough ophthalmic examination was performed at the patients' first visit, including tests for best-corrected visual

acuity (BCVA), intraocular pressure, slit-lamp biomicroscopy, anterior segment photography, and fundus examination. We excluded patients whose follow-up period was less than 6 months. We also excluded cases in which the remaining stromal haziness after excision was so minimal that they were not noticeable at a distance of 1m. All patients provided informed consent, and this study adhered to the tenets of the Declaration of Helsinki.

Methods The same surgeon (Kwon JW) performed all of the surgeries. Under topical anesthesia, limbal marking was performed to distinguish the corneal and conjunctival parts of the dermoid. The corneal part of the dermoid was excised using a straight beaver blade and Westcott scissors. A roughly partial incision was made with a beaver blade at the limbal margin in order to prevent the tissue-marking dye from passing into the conjunctiva and sclera area. The tissue-marking dye (Bradley Products Inc., Minneapolis, MN, USA), which had been sterilized in an autoclave at 134℃ for 6min before surgery, was used for black coloring. With the bevel up, the punctures were inserted into the anterior stroma using a 1mL disposable syringe with a 30-gauge needle, creating a relatively long puncture canal. Because the corneal surface was obscured by the dye after several punctures, the dye spread was confirmed by vigorous irrigation with a balanced salt solution (BSS) to visualize the achieved staining (Figure 1, 2A)[7, 8].

The conjunctiva was then dissected to expose the dermoid. Shaving was performed on the conjunctival part of the dermoid using a straight beaver blade (Figure 2B). The conjunctiva was sutured with 8-0 vicryl. The wounds were covered with therapeutic contact lenses, and patients received levofloxacin (Cravit; Santen Pharmaceutical Company, Osaka, Japan) and 1% prednisolone acetate (Pred Forte; Allergan, Irvine, CA, USA) 4 times a day for 1 month.

The patients were followed up on postoperative day 7 and at 1 month, 2, 6, 12, 18, 24, 36 months after surgery. Ophthalmic examinations, including the BCVA test, anterior segment photography, and slit-lamp examination were performed.

RESULTS

Dermoid excision and corneal part tattooing were performed in 9 eyes of 8 patients (3 men and 5 women) with a mean± SD age of 32±18 years (range, 10-65 years). The average follow-up was 50±15 months (range, 36-77 months). Seven of the 8 patients had isolated forms of limbal dermoid and the remaining 1 patient had an accompanying preauricular skin tag whose diagnosis was Goldenhar syndrome. Lesions were mainly located in the inferotemporal area (6 of 9 eyes; 67%) and in the left eye (6 of 9 eyes; 67%). BCVA ranged from hand motion to 20/16. BCVA of the 3 eyes in which the limbal dermoid occluded the visual axis ranged from hand motion to 20/250. In contrast, eyes in which the limbal dermoid did not occlude the visual axis (5 eyes) had a BCVA of more than 20/40, except for 1 patient, who had a BCVA of 20/800 (patient 1, Table 1).

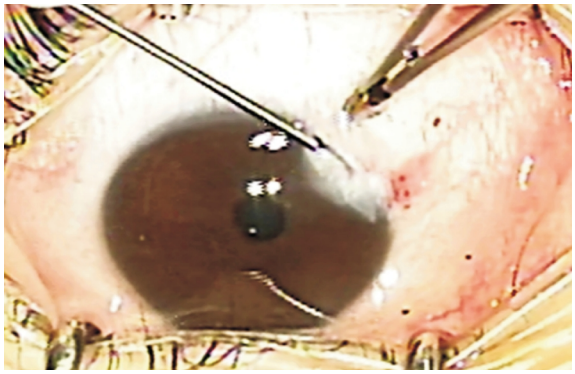

Figure 1 The surgical procedure. Tattooing is being performed after removing the corneal part of the dermoid. With the bevel up, the punctures were inserted into the anterior stroma using a 1mL disposable syringe with a 30-gauge needle, creating a relatively long puncture canal.

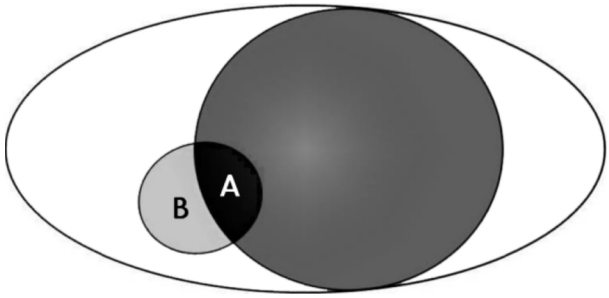

Figure 2 Corneal tattooing was performed in the corneal part A: Corneal part of the dermoid A was excised; B: Conjunctival part of the dermoid B was shaved.

All patients underwent primary excision of the limbal dermoid and corneal tattooing with no complications. All patients were satisfied with the postoperative cosmetic outcomes and there were no complications during the follow-up period. BCVA at 12 months after the operation remained unchanged compared to the preoperative BCVA (Table 1), and no recurrence was noted.

Case 1 A 26-year-old woman (patient 2, Table 1) was referred to our clinic for cosmetic surgery of a congenital corneolimbal lesion in the right eye. BCVA was 20/20 in the right eye. Anterior segment examination demonstrated a 3.5mm(H)×4.0mm(V) epithelialized and vascularized round opaque lesion attached to the 6 o'clock limbus of the right eye (Figure 3A). This lesion did not occlude the visual axis. The patient was clinically diagnosed with a corneolimbal dermoid and underwent surgery. After 1 month, her BCVA was 20/20 in the right eye, and anterior segment examination showed a well-stained corneal lesion in the right eye. She had no complaints about her eye condition, except for a mild foreign body sensation, which disappeared within 2 weeks. Fifty-five months later, her BCVA was maintained at 20/20, and the status of staining was stable (Figure 3B).

Table 1 Demographics of the patients diagnosed with limbal dermoids

n	Age (a)	Sex	Laterality	Location of dermoid	Size (H×V, mm)	Preop. BCVA	Postop. 6 months BCVA	Follow-up period (month)
1	20	F	Right	Inferotemporal	6×6	20/800	20/800	77
2	26	F	Left	Inferior	3.5×4	20/20	20/20	55
3	65	M	Left	Superotemporal	8×7	Hand Motion	Hand Motion	42
4	10	F	Left	Inferior	4.5×3	20/25	20/25	48
5	29	F	Left	Inferotemporal	8.5×7	20/250	20/250	66
6	19	M	Left	Inferotemporal	7.5×6	20/32	20/32	40
7	31	F	Left	Inferotemporal	4×3	20/16	20/16	39
8	50	M	Bilaterally	Inferotemporal	Right: 4.5×2; Left: 7×5	Right: 20/800; Left: 20/16	Right: 20/800; Left: 20/16	36

BCVA: Best-corrected visual acuity; H: Horizontal; V: Vertical.

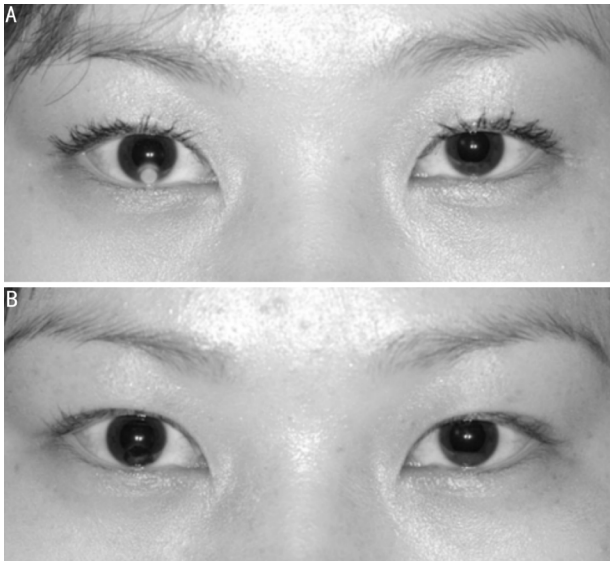

Figure 3 Anterior segment examination of patient 2 A: A 3.5mm (H)×4.0mm (V), slightly elevated, round, opaque lesion attached to the 6 o'clock limbus and which does not reach the visual axis is observed in the right eye; B: At postoperative 55 months, vision is unchanged and the cornea remains well stained and demarcated.

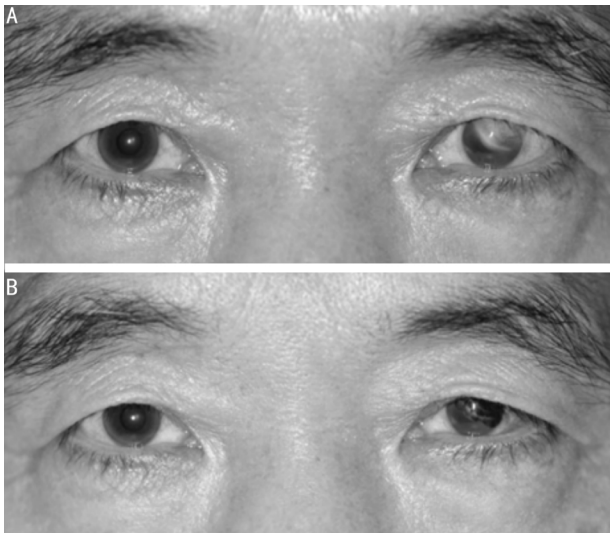

Figure 4 Anterior segment examination of patient 3 A: An epithelialized and vascularized peripheral corneal lesion from 10 to 4 o'clock is seen in the left eye, which extends into the visual axis; B: The well-demarcated and pigmented cornea is observed at postoperative 42 months.

Case 2 A 65-year-old man (patient 3, Table 1) visited our clinic with a congenital corneolimbal lesion in the left eye. BCVA was 20/20 in the right eye and hand motion in the left eye. The patient mentioned that the BCVA of his left eye had been poor since childhood. Anterior segment examination demonstrated an epithelialized and vascularized peripheral corneal lesion from 10 to 4 o'clock, and the corneal side had a yellowish lipid deposit that extended into the visual axis (Figure 4A). The patient was diagnosed with a corneolimbal dermoid and amblyopia in the left eye. He underwent dermoid excision and corneal tattooing simultaneously. Forty-two months later, the corneal tattooing was maintained with a well-formed corneal shape and with no specific complications (Figure 4B).

DISCUSSION

Lamellar keratoplasty of limbal dermoids has the advantage of a lower occurrence of postoperative complications, including corneal opacity, neovascularization, and pseudopterygium [4, 6]. However, unlike the simple excision, lamellar keratoplasty can be accompanied by severe complications, including graft rejection, infection, and irregular astigmatism, and requires a longer operation time, meticulous surgical skills, donor corneas, and high costs[9, 10]. In lamellar keratoplasty, it is also difficult to bring the donor limbal margin into line with that of the recipient. If this is inadequately done, the outcome can be cosmetically worse than that before corrective surgery. Patients sometimes refuse this operation for the above-mentioned reasons.

For these reasons, many surgeons and patients tend to choose simple excision. However, limbal dermoids penetrate the corneal and conjunctival stroma, making complete excision impossible, and leaving a whitish scar on the cornea. To solve this problem, we introduced corneal tattooing, which is usually performed for irreversible corneal opacity.

These combined techniques have the advantages of simplicity, reduced vision-threatening outcome, and maintenance of visual function. In the present study, we excluded cases if corneal opacity after excision was

unnoticeable at a distance of 1m at the operating room. We did not perform tattooing for these cases. BCVA of all patients was well maintained after surgery with no significant changes in refractive status. Panton and Sugar [5] stated that visual acuity did not decrease after simple excision, as was shown in our cases. It has also been reported that simple excision of limbal dermoids cannot change corneal astigmatism[5, 11]. If patients are young and the location of the dermoid is centered, lamellar keratoplasty may be a better option[12].

Several studies have reported that the use of tissue-marking dyes has been effective in treating glare associated with iris defects or corneal opacity, but no studies or cases have reported its effectiveness in resolving cosmetic problems related to limbal dermoids [13-15]. As seen in our cases, compared with simple excision alone, corneal tattooing with limbal dermoid excision resulted in better cosmetic outcomes without affecting visual functions.

Our study has some limitations, including its retrospective design, the small number of patients, and the lack of a control group. The efficacy of corneal tattooing may be more apparent if demonstrated by a prospective study focusing on cosmetic aspects, and if designed to compare lamellar keratoplasty with simple excision and corneal tattooing.

In conclusion, simple keratectomy of limbal dermoids with corneal tattooing results in good cosmetic and functional outcomes, and it could be a good choice of treatment if patients are selected appropriately.

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