

CASE REPORT

Tape-splint tarsorrhaphy technique to manage exposure keratopathy in a patient refusing surgical intervention

Soha Noorani¹   | Dooho Brian Kim²¹Philadelphia College of Osteopathic Medicine, Suwanee, Georgia, USA²Professional Eye Associates, Dalton, Georgia, USA**Correspondence**

Dooho Brian Kim, Professional Eye Associates, 1111 Professional Blvd, Dalton, GA 30720, USA.
Email: kim@professionaleyec.com

Key Clinical Message

This case report describes the benefits of a unique tape-splinting technique to serve as a nonsurgical tarsorrhaphy in the management of exposure keratopathy in a patient who refuses surgical intervention.

KEYWORDS

anterior segment, cornea, exposure keratopathy, floppy eyelid syndrome, medical therapy, noninvasive, ophthalmology, tape-splint tarsorrhaphy

1 | INTRODUCTION

Exposure keratopathy may be associated with a wide range of pathological processes, some of which include lagophthalmos from Bells palsy,^{1,2} lower eyelid ectropion from a lid tumor,³ or excessive eyelid laxity from floppy eyelid syndrome (FES).^{4,5} Exposure keratopathy typically requires some form of mechanical correction of the eyelid in order to rectify the problem, but there are circumstances in which the patient is either not cleared for surgery or refuses surgical intervention.

We describe a case of chronic, unilateral keratoconjunctivitis unresponsive to standard medical therapy. A detailed examination revealed exposure keratopathy from floppy eyelid syndrome. Tape-splint tarsorrhaphy (TST) has been recently described as a unique and noninvasive method to splint the lid for difficult-to-treat cases of persistent corneal epithelial defects.⁶ Here, the TST was used as a nonsurgical, temporizing tool to splint the eyelid down to address corneal exposure. Resolution of signs and symptoms was diagnostic and therapeutic confirmation that the keratoconjunctivitis resulted from exposure keratopathy. This is the first such report to our knowledge discussing the specific use of the tape-splint tarsorrhaphy as a non-surgical treatment method to combat exposure keratopathy in a patient who refuses surgical treatment.

2 | CASE PRESENTATION

A 63-year-old female initially presented to her primary care physician for persistently irritated and red left eye (OS). Past medical history was significant for developmental cognitive delay with a history of childhood sleep apnea and use of continuous positive airway pressure (CPAP). She is currently on bilevel-positive airway pressure (BiPAP). Pertinent social history is relevant for requiring constant care by her mother due to her multiple chronic medical problems. Past ocular and family history were otherwise non-contributory. After failing a trial of olopatadine (Pataday, Alcon) eye drops and topical polymyxin B/trimethoprim antibiotic drops, she was referred to optometry.

At the optometrist visit, the patient complained of persistent burning sensations, tearing, and blurry vision. Ocular examination revealed 1–2+ inferior bulbar conjunctival injection OS with reduced tear volume in both eyes (OU). She was seen for two follow-up visits during which she trialed aggressive lubrication with erythromycin ophthalmic ointment, cyclosporine 0.05% drops (Abbvie, N), oral 1000 mg supplemental fish oil, and oral hydration without subjective improvement. She was then referred to ophthalmology (D.B.K.) for a second opinion.

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial-NoDerivs](https://creativecommons.org/licenses/by-nc-nd/4.0/) License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2023 The Authors. *Clinical Case Reports* published by John Wiley & Sons Ltd.

The patient presented to us in the ophthalmology clinic rather frustrated. Examination showed persistent 2+ conjunctival injection and 2+ punctate keratopathy OS. There was also peripheral corneal vascularization and subepithelial haze along the inferior one-fourth of the cornea in the left eye, suggestive of chronicity. Retraction of the upper eyelids revealed a fairly normal tarsal plate in the right eye (Figure 1A); however, there was profound flaccidity of the left upper eyelid, such that the upper eyelid margin was retractable 15 millimeters (mm) above the superior orbital rim (Figure 1B). There was also 1.5 mm of lagophthalmos OS only (Figure 2). Schirmer 2 testing revealed 21 mm of wetting OD and 22 mm OS.

Due to the atypical presentation of extreme asymmetry in eyelid flaccidity, and in light of the long-standing history of OSA, the diagnosis of floppy eyelid syndrome was made as the probable cause for exposure keratopathy. The patient was counseled on these conditions and their association with obstructive sleep apnea (OSA). Temporizing treatment options were discussed, including continued aggressive lubrication, taping of the eyelids, and moist chamber goggles.⁷ However, it was reiterated that surgical intervention would be necessary for definitive treatment.

The patient refused to have any surgical intervention, so the tape-splint tarsorrhaphy (TST) was chosen as a non-surgical method to close the eyelid. The TST was placed over the left eyelid in the office (Figure 3) and the mother was instructed on how to apply it at home. She was counseled to maintain the TST during the day as much as possible and at bedtime.

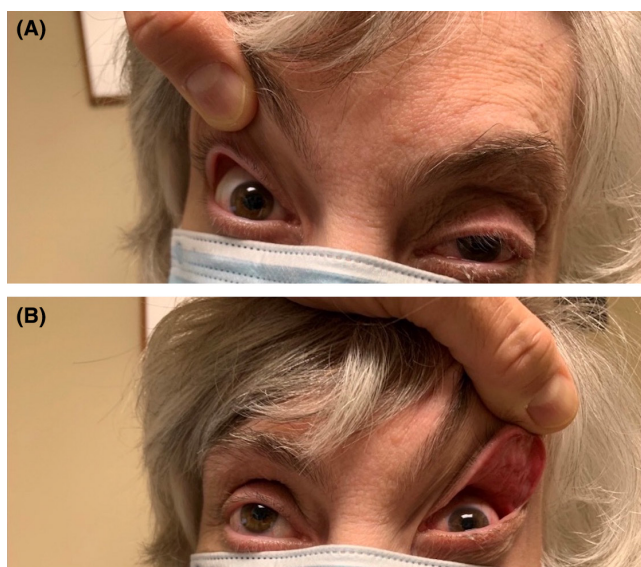


FIGURE 1 (A) Upward retraction of the right upper eyelid shows normal stretch of the eyelid margin to the orbital rim. (B) Upward retraction of the left upper eyelid shows significant eyelid laxity with the eyelid margin being stretched 15 mm above the orbital rim.

The patient returned 1 month later with dramatic improvement in both signs and symptoms. The punctate keratopathy and conjunctival injection were resolved in the left eye; however, the inferior corneal vascularization and haze persisted. The patient and her mother were counseled extensively about the limitations of TST and that definitive treatment in the form of surgery to address the eyelid laxity would likely be needed if the problem recurred.

The patient missed the 3 month follow-up but returned in 6 months and was found to have recurrent keratoconjunctivitis due to poor compliance. Surgical correction of the FES with a surgical tarsorrhaphy or lateral tarsal strip was reiterated and encouraged as a more definitive treatment toward resolution; however, the patient continued to refuse surgical intervention.

3 | DISCUSSION

When managing a case of keratoconjunctivitis, the differential diagnosis can be broad; it may include dry eye syndrome, blepharitis, a multitude of inflammatory processes, and infectious etiologies. It is imperative to perform a detailed examination that includes a thorough slit lamp examination. A unilateral case of keratoconjunctivitis recalcitrant to medical therapy is highly unusual and requires a high index of suspicion to look beyond



FIGURE 2 Upon eyelid closure, there is no lagophthalmos in the right eye and ~1.5 mm lagophthalmos in the left eye.



FIGURE 3 Application of the tape-splint tarsorrhaphy reveals complete closure of the left eyelid with no evidence of corneal exposure.

the typical causes. Upper eyelid eversion is required to identify conjunctival foreign bodies, evaluate the palpebral conjunctiva for any papillary or follicular reactions, and assess the amount of tarsal laxity.⁸ Here, exposure keratopathy was initially missed, and further examination revealed an extreme floppy eyelid. In this context, exposure keratopathy is a mechanical problem, which requires a surgical solution to tighten the eyelid to reduce corneal exposure.⁹ As a result, ocular lubrication alone will be ineffective.

Surgical intervention with a lid tightening procedure such as a lateral tarsal strip or surgical tarsorrhaphy was strongly recommended as a permanent solution. Botox (Abbvie, N) injections to the upper eyelid induces a temporary paralytic ptosis to effectively close the eyelid, but it may take up to a week to take effect and is costly for the patient.¹⁰ Moreover, this patient adamantly refused any surgery or even needle injections.

Cyanoacrylate glue can be used to seal the eyelids together, but issues include corneal abrasion and the potential for the lashes to fuse with the glue.^{7,11,12} The therapeutic role of scleral contact lenses extends to treating ocular surface disease, though they require fitting, can feel bulky and large, and are not frequently covered by insurance.^{13,14} Therefore, the only viable options left were lid occlusion with tape adhesives. Taping the eyelid from forehead to cheek in the traditional fashion works poorly in patients with deep-set orbits. Nasal dilator strips^{12,15} (Breathe Right Nasal Strips) and Steristrips¹⁶ (3M) have also been used to close the eyelids, but these are relatively expensive.

Mimouni et al. describe tape-splint tarsorrhaphy (TST) as a unique, nonsurgical technique to splint the eyelid closed in order to treat persistent corneal epithelial defects.⁶ The benefits of this method include accessibility, reversibility, and non-invasiveness, which were all vital for our patient. TST is completely different from traditional taping in that the tape is only applied to the upper eyelid to function as a splint. The patient is asked to close the eyelids, and while the examiner retracts the patient's eyebrow superiorly, the eyelid is placed on stretch to eliminate the natural lid crease. A two-inch piece of medical-grade plastic tape (3M) is applied such that the tape covers the entire upper eyelid. In other words, the bottom edge of the tape is placed on the upper eyelid from the level of the lash line up toward the brow. The stiffness and rigidity of the tape effectively create a splint, thereby preventing the upper eyelid from opening, which, in turn, results in an effective, nonsurgical tape-tarsorrhaphy.

The tape is easily accessible and eye-care specialists can teach patients how to apply the TST independently. Patients or caregivers can reapply the tape at home

without having to reschedule an appointment to the clinic. Limitations of the TST include patient dependence to properly apply the tape, potential for allergy to the tape adhesive, and possible instability of the tape throughout the day or night. Wiping the eyelid skin with an alcohol wipe to remove the sebaceous oils before applying helps to preserve the adherence of the TST, and application of two or more layers of tape can fortify the splinting effect of the TST.

We describe a new use of the TST as a diagnostic and therapeutic maneuver to help determine the cause for unilateral keratoconjunctivitis recalcitrant to medical therapy. Our patient was found to have extreme left eyelid laxity and exposure keratopathy, complicated by her refusal of definitive surgical treatment. Application of the TST directly resulted in immediate and dramatic clinical improvement. We cannot overstate the importance of surgery aimed at definitively correcting lid laxity. These may include lateral tarsal strip, full-thickness wedge incision, canthal tendon plication, medial lid shortening, and lateral tarsorrhaphy;⁷⁻⁹ however, when faced with a patient who refuses surgery, the TST is arguably the best non-invasive strategy to provide complete lid closure to control exposure keratopathy as it is simple, easy to perform, inexpensive, and highly effective.

AUTHOR CONTRIBUTIONS

Soha Noorani: Writing – original draft; writing – review and editing. **Doocho Brian Kim:** Conceptualization; data curation; supervision; writing – original draft; writing – review and editing.

FUNDING INFORMATION

No outside funding was provided for the research related to this manuscript.

CONFLICT OF INTEREST STATEMENT

The authors have no relevant conflicts of interest to declare.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data was created or analyzed in this study.

ETHICS STATEMENT

This case report did not require ethics approval.

CONSENT

The patient is unable to consent due to long-standing cognitive deficits. Therefore, written informed consent was obtained from the patient's mother, who has power of attorney.

ORCID

Soha Noorani  <https://orcid.org/0009-0008-1187-421X>

TWITTER

Soha Noorani  soha_noorani

REFERENCES

- Alhoutan K, Alarfaj K. Exposure keratopathy: an idiopathic lagophthalmos case report. *Cureus*. 2021;13(10):e18945. doi:10.7759/cureus.18945
- Pereira MV, Glória AL. Lagophthalmos. *Semin Ophthalmol*. 2010;25(3):72-78. doi:10.3109/08820538.2010.488578
- Rubin P, Mykula R, Griffiths RW. Ectropion following excision of lower eyelid tumours and full thickness skin graft repair. *Br J Plast Surg*. 2005;58(3):353-360. doi:10.1016/j.bjps.2004.11.003
- Culbertson WW, Ostler HB. The floppy eyelid syndrome. *Am J Ophthalmol*. 1981;92(4):568-575. doi:10.1016/0002-9394(81)90652-8
- Din N, Vasquez-Perez A, Ezra DG, Tuft SJ. Serious corneal complications and undiagnosed floppy eyelid syndrome; a case series and a 10-year retrospective review. *J Curr Ophthalmol*. 2019;31(2):225-228. doi:10.1016/j.joco.2019.03.003
- Mimouni M, Liu ES, Din N, et al. Tape splint tarsorrhaphy for persistent corneal epithelial defects. *American journal. Ophthalmology*. 2022;237:235-240. doi:10.1016/j.ajo.2021.12.006
- Wolkow N, Chodosh J, Freitag SK. Innovations in treatment of lagophthalmos and exposure keratopathy. *Int Ophthalmol Clin*. 2017;57(4):85-103. doi:10.1097/IIO.0000000000000185
- De Gregorio A, Cerini A, Scala A, Lambiase A, Pedrotti E, Morselli S. Floppy eyelid, an under-diagnosed syndrome: a review of demographics, pathogenesis, and treatment. *Ther Adv Ophthalmol*. 2021;13:25158414211059247. doi:10.1177/25158414211059247
- Valenzuela AA, Sullivan TJ. Medial upper eyelid shortening to correct medial eyelid laxity in floppy eyelid syndrome: a new surgical approach. *Ophthalm Plast Reconstr Surg*. 2005;21(4):259-263. doi:10.1097/01.iop.0000169142.29484.c6
- Ellis MF, Daniell M. An evaluation of the safety and efficacy of botulinum toxin type a (BOTOX) when used to produce a protective ptosis. *Clin Exp Ophthalmol*. 2001;29(6):394-399. doi:10.1046/j.1442-9071.2001.d01-28.x
- Ehrenhaus M, D'Arienzo P. Improved technique for temporary tarsorrhaphy with a new cyanoacrylate gel. *Arch Ophthalmol*. 2003;121(9):1336-1337. doi:10.1001/archophth.121.9.1336
- Pandit RT. Use of the breathe right external nasal dilator strip as temporary eyelid splint. *Cornea*. 2012;31(6):720-721. doi:10.1097/ICO.0b013e318242fd28
- Pullum KW, Whiting MA, Buckley RJ. Scleral contact lenses: the expanding role. *Cornea*. 2005;24(3):269-277. doi:10.1097/01.ico.0000148311.94180.6b
- Chahal HS, Estrada M, Sindt CW, et al. Scleral contact lenses in an academic Oculoplastics clinic: epidemiology and emerging considerations. *Ophthalm Plast Reconstr Surg*. 2018;34(3):231-236. doi:10.1097/IOP.0000000000000929
- Magone MT, Seitzman GD, Nehls S, Margolis TP. Treatment of neurotrophic keratopathy with nasal dilator strips. *Br J Ophthalmol*. 2005;89(11):1529-1530. doi:10.1136/bjo.2005.07311
- Hildebrand GD, Painter SL. A simple technique for temporary eyelid closure in severe exposure keratopathy. *J AAPOS*. 2014;18(6):605-606. doi:10.1016/j.jaapos.2014.07.171

How to cite this article: Noorani S, Kim DB. Tape-splint tarsorrhaphy technique to manage exposure keratopathy in a patient refusing surgical intervention. *Clin Case Rep*. 2023;11:e7797. doi:10.1002/ccr3.7797