

# Case Report: Management of complications following DALK in previous successful scleral lens wearer

Chun Kit B. Wong BSc, OD\*; Lacey Haines BSc, OD, FIACLE

School of Optometry & Vision Science, University of Waterloo, Waterloo, Ontario, Canada.

\*cbwong@uwaterloo.ca

## Background

- Pellucid marginal degeneration (PMD) is a corneal thinning disease often treated with rigid contact lenses, or through surgical intervention such as corneal crosslinking (CXL), intrastromal corneal ring segments (ICRS) or penetrating keratoplasty (PKP).
- It has been noted in the literature that surgical management of PMD with PKP is difficult due to the large eccentric grafts and proximity to limbal cells which can increase the chance of graft rejections<sup>1</sup>
- Deep anterior lamellar keratoplasty (DALK) differs from PKP by leaving the host Descemet membrane and endothelium intact in the hopes of reducing complications associated with trauma to the endothelium including reduced endothelial rejection<sup>2</sup>
- DALK provides a more compelling surgical outcome for PMD patients by reducing risk of rejection<sup>3</sup>

## Purpose

- This case report will describe the management of an early graft rejection in a patient who had undergone DALK

## Case History

- A 59-year-old white male (patient GS) presents to the clinic Oct of 2020 with concerns of a red right eye that started 1 week early.
- The patient has a history of PMD OU worse in the right eye, CXL in 2016 both eyes, and DALK in Nov of 2019 (11 months ago) in the right eye. The only complication noted following the DALK was increased IOP from steroid response.
- Previous to surgical intervention, this patient was referred to the clinic to be fitted with scleral lenses for the management of his PMD. The patient was able to be fit successfully in Onefit MED™ monocularly in the right eye and achieved 20/20<sup>+2</sup> vision.
- The reason for discontinuing scleral lens wear was due to the inconvenience of insertion and removal which our patient continued to have difficulty with for two years. The lens was comfortable, and the patient appreciated the vision, but he could not integrate the insertion and removal process well into his lifestyle.
- His desire for more visual freedom prompted him to seek surgical options even though he stated he already achieved “HD vision” with scleral lens wear.

## Examination

At presentation, patient GS reports he has significant epiphora, photophobia, foreign body sensation (FBS), blurry vision and mild itching, all symptoms of which have been constant from 1 week ago.

OD		OS
FC	VA Unaided	20/30 <sup>+2</sup>
20/50	BCSVA + PH	20/25
PERRL	Pupils	PERRL
13	IOP (iCare™ Ic100)	17
1:0.75	Angles	1:0.75

OD		OS
1+ diffuse hyperemia 2+ circumlimbal injection	Conjunctiva	Tr hyperemia
s/p DALK, interrupted + running sutures (-) infiltrates 1+ corneal edema with microcysts Few endothelial dropout Trace neovasc superior and inferior outside corneal graft ~0.5mm	Cornea	Inferior thinning Fleischer's Ring
(-) cells/flare	Anterior Chamber	(-) Cells/flare

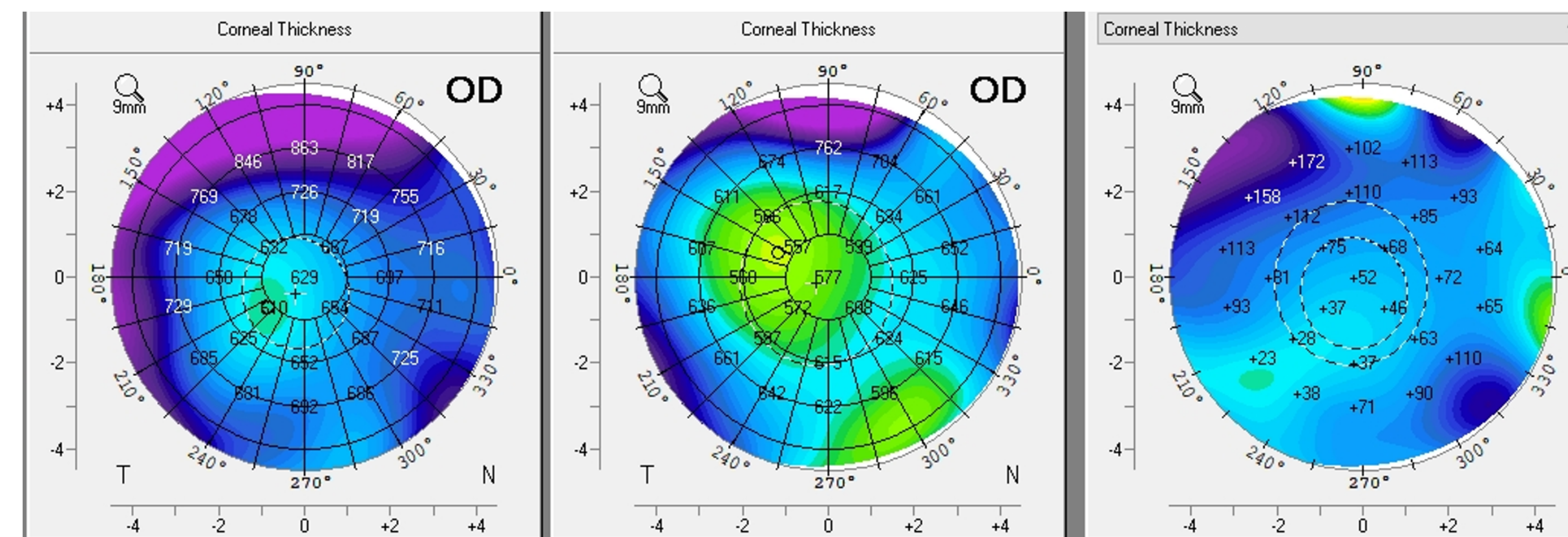


Figure 1: Corneal tomography with a Pentacam™ HR comparing thickness on exam day (left) versus thickness 2 months prior (center) reveals a difference map (right) indicating corneal edema +50um centrally .

Scheimpflug camera tomography is generally reliable when measuring CCT of <650µm and have been used in the past to reliably measure post surgical corneal edema.<sup>4</sup> Overestimation has been noted, however, in corneas with extreme opacity and or extreme levels of edema. The results for patient GS are within the recommended limit of application.

## Diagnosis and Management

- Typically, a graft rejection includes the presentation of infiltrates which this case did not demonstrate. In the case of DALK, endothelial infiltrates (a Khadadoust line) is not possible, but subepithelial infiltrates (Krachmer spots) are still possible
- Differential diagnoses for these signs and symptoms can include bacterial or viral keratitis or herpes simplex reactivation, but given the lack of pain and lack of history with herpes simplex keratitis, the most likely diagnosis was a graft rejection episode due primarily to the sudden onset of corneal edema and photophobia
- The patient was given a loading dose of prednisolone acetate 1% in office immediately and was prescribed dexamethasone 0.1% Q2H and prophylactic moxifloxacin QID. An urgent referral was made to the ophthalmologist who performed the DALK and the patient was scheduled to be seen in four days
- As the patient was previously a steroid responder, he was told to return to our clinic the next day for an evaluation of his condition and a repeat IOP measurement

## Follow-Up Care

- The patient returned the next day stating significantly improved symptoms: reduced epiphora, photophobia, FBS and itching
- IOP by iCare™ (rebound tonometry – RT) was 18mmHg and 17mmHg, OD and OS respectively. Repeated IOP with Goldmann (GAT) reveals 23mmHg and 16mmHg OD and OS respectively.
- Dexamethasone was decreased to QID following the exam until seen again for follow-up. Topical IOP lowering agents were considered but not administered at the 1 day follow-up as they were to be seen in a few days by the ophthalmologist
- Timolol was eventually added a few weeks later by the ophthalmologist, and a slow steroid taper was initiated
- Subsequent follow-up at 1-month revealed improved corneal edema, however at this appointment the patient had noted significant FBS for the past few days. Examination revealed a 2-3mm loose suture end and no corneal edema (Figure 2)
- A prophylactic antibiotic (moxifloxacin) was resumed TID and a referral was sent to have the suture removed
- Follow-up at 2-months revealed an IOP by GAT of 24mmHg in OD

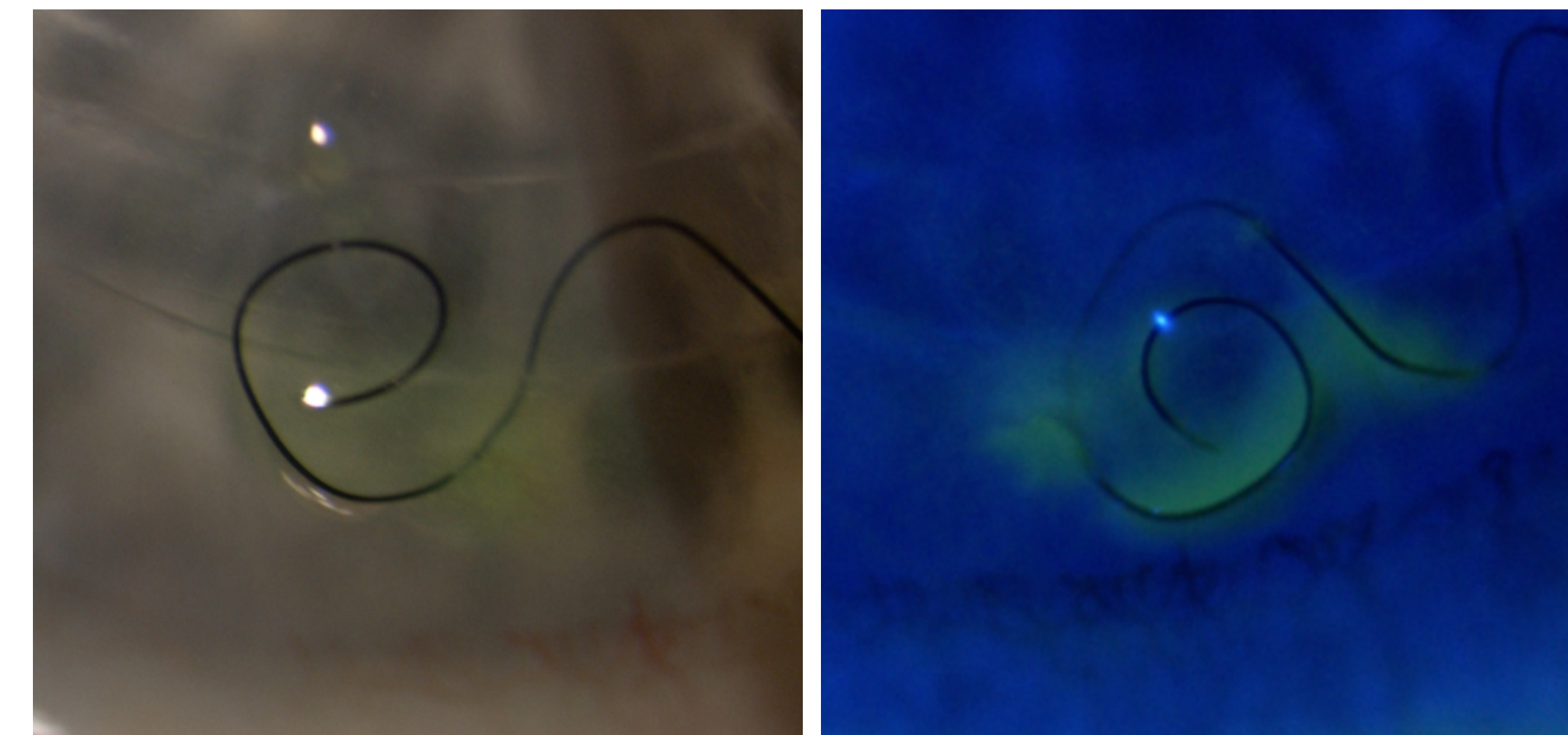


Figure 2: Slit lamp image (S4 Optik SL9900) of a broken running suture in white light (left) and in blue light with fluorescein (right) 1 month after the initiation of steroid treatment. The position of the loose suture changes with blink.

- The patient is tapering steroids and waiting for future refractive surgery to enhance vision
- The outcome of the refractive surgery and whether he can achieve pre-operative BCVA of 20/20<sup>+2</sup> remains to be seen

## Discussion

- The incidence of rejection for DALK has been noted to be less than PKP<sup>3</sup>. Even though DALK is a more difficult and more novel procedure, the decreased risk of rejection as well as ability to treat thinning diseases close to the limbus such as PMD provide a distinct advantage over PKP
- The choice of aggressive steroid treatment has been shown to reverse rejection episodes and prevent complete failure of corneal grafts. Delay in treatment even by one day has been shown to have significant impact on visual outcome<sup>5</sup>. It is likely the timeliness of treatment as well as the frequency of dosing played a crucial part in preventing total loss of the corneal graft
- Literature suggests that RT and GAT are comparable and reliable in corneas with post surgical edema<sup>6</sup>. The increase in IOP when comparing RT to RT indicated a positive steroid response – note that when comparing again GAT to GAT at the 1 and 2 months follow-up, it appears the timolol has minimal effect. This could also be due to the difference in corneal hysteresis between the first and second follow-ups
- Loose sutures poses the risk of infectious keratitis or neovascular growth which can incite graft rejection, timely referral and coverage with antibiotics was crucial to prevent further complications

## Conclusion

- Immediate and aggressive steroid therapy is effective at reversing early graft rejection
- The patient wanted more vision and freedom from scleral lenses but currently has less. Although pending for refractive surgery, if the visual outcome is not ideal, scleral lenses can be considered again in the future

## References

- Jinabhai A, Radhakrishnan H, O'Donnell C. Pellucid corneal marginal degeneration: A review. *Contact Lens and Anterior Eye*. 2011;34(2):56-63. doi:10.1016/j.clae.2010.11.007
- Reinhart WJ, Musch DC, Jacobs DS, Lee WB, Kaufman SC, Shtein RM. Deep anterior lamellar keratoplasty as an alternative to penetrating keratoplasty: A report by the American academy of ophthalmology. *Ophthalmology*. 2011;118(1):209-218. doi:10.1016/j.ophtha.2010.11.002
- Akanda ZZ, Naem A, Russell E, Belrose J, Si FF, Hodge WG. Graft rejection rate and graft failure rate of penetrating keratoplasty (PKP) vs lamellar procedures: A systematic review. *PLoS ONE*. 2015;10(3). doi:10.1371/journal.pone.0119934
- Wongchaisuwat N, Methetairat A, Chonpimai P, Nujoi W, Prabhasawat P. Comparison of central corneal thickness measurements in corneal edema using ultrasound pachymetry, visante anterior-segment optical coherence tomography, cirrus optical coherence tomography, and pentacam scheimpflug camera tomography. *Clinical Ophthalmology*. 2018;12:1865-1873. doi:10.2147/OPH.S172159
- Bali S. Corneal Graft Rejection: A Review Of Literature And Recent Advances Covid-19 Project View Project DALK for Keratoconus View Project.; 2010. http://www.webmedcentral.com//article\_view/1199
- Fuest M, Mamas N, Walter P, Plange N. Tonometry in corneal edema after cataract surgery: Rebound versus goldmann applanation tonometry. *Current Eye Research*. 2014;39(9):902-907. doi:10.3109/02713683.2014.888451

## Acknowledgements & Disclosures

The authors would like to thank the faculty and staff at the University of Waterloo School of Optometry and Vision Science Contact Lens Clinic for their assistance with the clinical care and management of this patient. The authors have no financial interests in the subject matter of this poster. All rights reserved. All data and images were collected, compiled and are exclusively owned by the UWISO. Unauthorized utilization, editing, reproduction or distribution of this poster or any part thereof is strictly prohibited.