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Case report

Rare corneal complication following selective laser trabeculoplasty

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ABSTRACT

Purpose: This case report describes two glaucoma patients who underwent selective laser trabeculoplasty (SLT) and developed a rare post-procedure corneal complication and subsequent permanent corneal distortions and reduced acuity.

Observations: Both patients experienced early post-procedure corneal edema, reduced visual acuity, and pain. Each patient was treated with topical steroids with resolution of the edema, but each patient had irregular corneal astigmatism which was not present pre-operatively and did not resolve.

Conclusions and importance: There are very few reported cases of post-SLT corneal edema and these typically resolve without long-term complications. The following two cases represent an uncommon adverse event of irregular corneal astigmatism despite resolution of the corneal edema. The exact mechanism of these corneal effects is not known. Practitioners should inform patients of this rare, but possible complication following SLT and consider extra precautions in patients susceptible to corneal edema.

1. Introduction

Selective laser trabeculoplasty (SLT) was approved in 2001 by the US Food and Drug Administration as a treatment for elevated intraocular pressure (IOP). SLT uses a 532nm frequency-doubled, Q-switched Nd:YAG laser to treat the trabecular meshwork (TM) with a gonioscopic lens. The mechanism by which SLT lowers IOP is not completely understood.[1] The favored biological theory proposes that SLT works by increasing macrophage activity and inflammatory cytokines that remodel the extracellular matrix of the TM resulting in increased outflow.[1,2] The IOP lowering effect is similar to argon laser trabeculoplasty (ALT), but theoretically causes less collateral damage to the TM and Schlemm's canal as SLT uses only 1% of the energy compared to ALT.[3] Thus, SLT is generally considered more safe than ALT and is equally as effective. Post-operative SLT side effects include acute IOP spike, anterior segment inflammation, redness, and pain.[1,4] These side effects are infrequent, generally mild in severity, transient, and typically resolve within a few days without treatment. The following two cases describe an atypical corneal complication of SLT.

2. Findings

2.1. Case 1

A 69 year old Caucasian male presented with difficulty in reading in his left eye despite cataract surgery and YAG capsulotomy. His past medical history was significant for colon, bladder and testicular cancer, benign prostatic hyperplasia, and hearing loss. He had a positive family history of glaucoma in his mother and maternal grandfather.

His examination revealed best corrected visual acuity of 20/15 in the right eye and 20/25- in the left. Prior to cataract surgery, he had moderately high myopia (−6.00D right eye and −5.00D left eye). Post-operatively he was plano in the right eye and low myopia with astigmatism in the left eye. His intraocular pressures were 19 mmHg in the right eye and 22 mmHg in the left eye. His pupils revealed a mild afferent pupillary defect in the left eye. Pachymetry readings were 542 μm/544μm in right and left eyes, respectively. Gonioscopy was open to the ciliary body band in both eyes. His anterior segment findings showed bilateral clear corneas. The vertical cup:disc ratio of the optic nerve was 0.65 in the right eye and 0.85 in the left with a thin inferior rim.

Additional testing with the Humphrey visual field in his right eye showed good reliability and a few scattered points that did not match his optic nerve or retinal nerve fiber layer imaging. His left eye was reliable and showed a superior retinal nerve fiber layer type defect with a central defect, and a superior nasal step. The left eye field was repeated and these defects were confirmed. Optic nerve imaging with Spectralis OCT showed that his left optic nerve demonstrated borderline thinning of the inferior retinal nerve fiber layer, which corresponded with the visual field defect and the clinical appearance of the nerve.

Given these clinical findings and test results, the patient was diagnosed with normal tension glaucoma, mild stage in the right eye and

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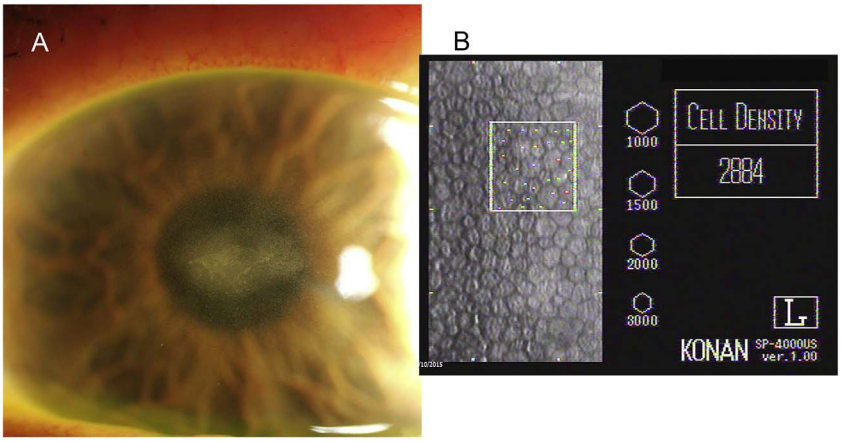

Fig. 1. A: Anterior segment image of the OS showing dense, central corneal edema. B: Specular microscopy of the OS showing normal morphology and number.

severe stage in the left. To reach the target IOP, the patient elected to have SLT in the left eye that same day. Proparacaine topical anesthetic was instilled, Goniovisc™ (HUB pharmaceuticals) was used with the gonioscopy lens, and SLT was performed with 100 spots treating 360° of the trabecular meshwork with 0.7 mJ, which falls within the typical number of spots and typical power range of 0.4–1.4 mJ[1]. Iopidine (aproclonidine) was instilled in the left eye before and after the procedure. Thirty minutes after the procedure, the cornea was clear and the IOP was 22 mmHg. The patient was instructed to use ketorolac four times a day for four days and to return in a week for a follow-up.

The patient returned on an urgent basis three days later with complaints of blurred vision, discomfort, tearing, and redness in the left eye which began at one day post-op. His IOP was 17 mmHg and acuity was reduced to 20/300 due to dense central stromal corneal edema (Fig. 1A) with an intact epithelium. View of the anterior chamber was difficult due to the corneal haze but mild cell was noted without presence of hypopyon. He was started on topical prednisolone four times a day and ketorolac was discontinued. Over the next three months, the corneal edema resolved without corneal scarring, but his vision remained at 20/100. During this period, he had an initial hyperopic shift and increase in astigmatism that ultimately shifted to be less hyperopic but the astigmatism remained.

At five month post-operative, he was referred to the cornea clinic due to persistent poor vision where his pachymetry readings were repeated which were stable and symmetric in both eyes. Specular microscopy and topography testing were performed and revealed normal endothelial cell density (Fig. 1B) and irregular astigmatism with steepening superiorly in his left eye (Fig. 2). At the 7 month visit, his vision remained at 20/80 and he was referred to optometry for a rigid gas permeable (RGP) lens fitting. Topography was repeated and was essentially stable. The refraction revealed 20/60 best corrected vision with a 1.25 diopter increase in regular astigmatism compared to baseline. With an RGP, he was able to achieve 20/30, which was essentially his baseline acuity before the SLT and was likely limited due to the central field loss from glaucoma.

2.2. Case 2

A 60 year old Caucasian female with untreated, moderate stage primary open-angle glaucoma and no family history of glaucoma was examined at Kellogg Eye Center. Her past medical history was significant for hypothyroidism treated with levoxyl. Her vision was 20/20 in both eyes with high myopia. Her vertical cup:disc ratio was 0.7 in the right eye and 0.6 in the left. Her angle in both eyes was open to ciliary body band with 3–4 + pigment. Her pachymetry readings were 566μm/560μm. The glaucoma specialist decided this patient required IOP lowering. Given her history of moderate-severe dry eye and contact lens wear, the patient preferred to avoid the use of topical glaucoma drops and elected for SLT in the left eye. SLT was performed (50 spots for 180°, 0.9–1.1 mJ/pulse). The patient was only treated 180° given the heavy pigmentation in the trabecular meshwork. Immediately after the procedure, there were no complications and the cornea and IOP were stable.

The patient presented after one week and noted pain and blurred

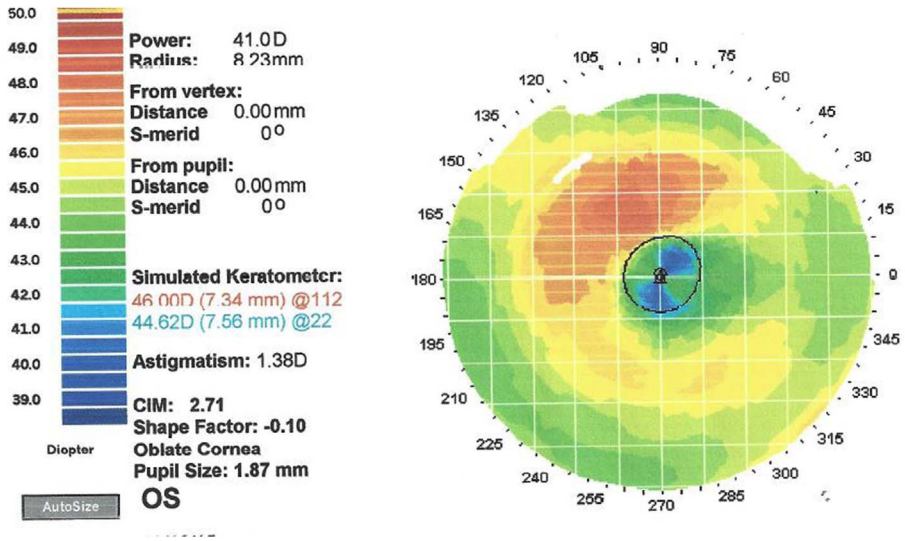

Fig. 2. Topography of the OS showing irregular astigmatism.