Resolution of EBMD Induced Monocular Diplopia After TBI with Corneal Gas Permeable Contact Lenses

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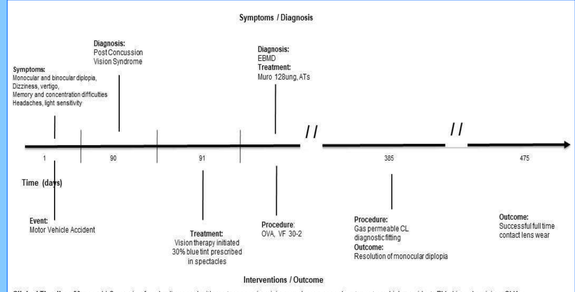
Background

- Epithelial basement membrane dystrophy (EBMD) is the most common anterior corneal dystrophy.[1]
- Poor adherence of the basal epithelial cells to the basement membrane results an irregular corneal surface.[1]
- When this occurs in the visual axis, the induced corneal irregularity may cause symptoms of monocular diplopia and visual distortion.[2]
- Traumatic brain injury (TBI) is an interruption of brain function secondary to trauma by blunt force, jolt or penetrating injury to the head.[3]
- Visual symptoms are recorded in 75% of TBI cases.[4]
- Monocular diplopia following TBI is an uncommon manifestation and there is nominal literature on this topic.
- The value of considering corneal gas permeable (GP) lenses to alleviate symptoms of monocular diplopia secondary to EBMD for a patient with a history of TBI will be demonstrated in this report.

Case Description



Clinical Timeline: 50 year old Caucasian female diagnosed with post concussion vision syndrome secondary to motor vehicle accident. BV= binocular vision, OVA= oculovisual assessment; EBMD= epithelial basement membrane dystrophy, VF = visual field, CL = contact lens.

- A healthy 50 year old Caucasian woman with a history of TBI secondary to a motor vehicle accident was referred for contact lens fitting to determine if symptoms of monocular diplopia may be resolved with GP contact lenses.
- The symptoms of monocular diplopia coincided with symptoms of post-concussion syndrome (PCS) which included: vertigo/dizziness, memory and concentration difficulties, headaches, light sensitivity and diplopia.
- Vision therapy was initiated by her binocular vision specialist along with 30% blue tint prescribed in spectacles.
- The patient is continuing follow up with her vision therapist and physiotherapist for management of PCS

Contact Lens Diagnostic Fitting

- Corneal topography with Pentacam® revealed corneal irregularity in both eyes correlating with central anterior basement membrane changes and negative staining observed with slit lamp.
- A diagnostic fitting was performed with a corneal GP tricurve fitting set.
- An over-refraction of +2.25/-0.75x88 and +2.75/-0.75x95 was obtained in the right eye and left eyes respectively resulting in BCVA of 20/20 in both the right and left eyes.
- An aligned fit was obtained with the trial lens in the right eye and a slightly flat central fit with apical rotation after the blink was observed in the left eye.
- Therefore, the final order in the left eye was adjusted by steepening the base curve by 0.1mm and compensating the spherical power accordingly. A front toric lens design was ordered to apply residual astigmatism to the front surface of the lens with prism ballast for stabilization.
- A dark blue tint was requested to match the spectacle tint.

Table 1 Diagnostic Lens Fitting Parameters, Over-Refraction and BCVA

	Lens Type	Base Curve	Diameter	Power	Over-Refraction	Visual Acuity
OD	Corneal GP Tricurve	7.34	9.2	-3.00	+2.25/-0.75x88	6/6
OS	Corneal GP Tricurve	7.34	9.2	-3.00	+2.75/-0.75x95	6/6

Table 2 Final Lens Parameters

	Lens Type	Base Curve	Diameter	BOZD	Power
OD	Corneal GP Tricurve	7.34	9.2	7.8	-0.75/-0.75x88
OS	Corneal GP Tricurve	7.24	9.2	7.8	-0.75/-0.75x95

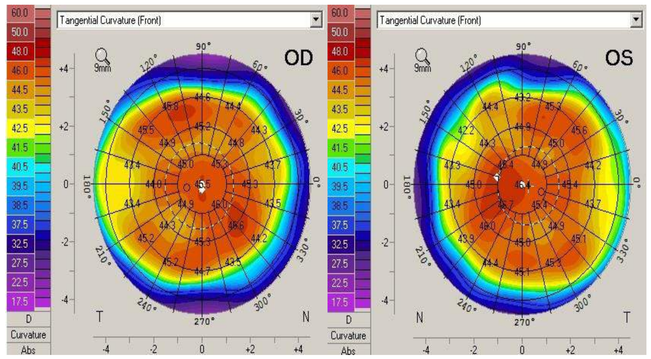


Figure 1. Tangential curvature maps demonstrating the presence of corneal irregularity in both eyes.

Contact Lens Delivery and Follow Up

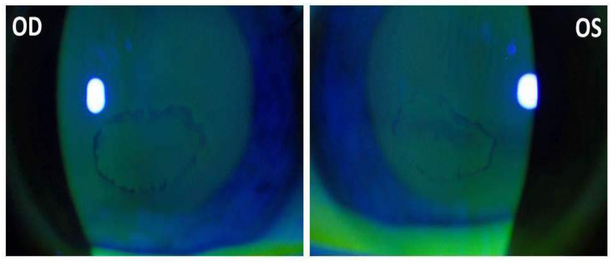


Figure 2. Application of sodium fluorescein revealed paracentral areas of negative staining with use of blue light and yellow barrier filter (Wratten #12) seen above.

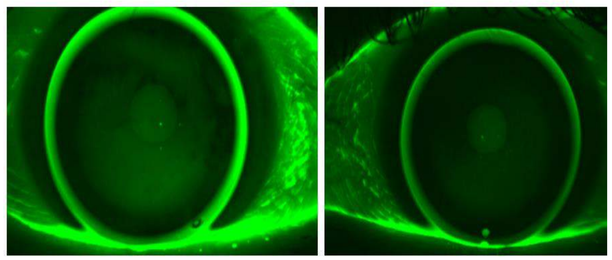


Figure 3. Illustrates the fluorescein patterns that were achieved after the fitting visit

- At the contact lens delivery appointment, the patient appreciated significant relief in her symptoms of monocular diplopia which had been constant for over a year.
- On subsequent follow up appointments, the lenses continued to provide clear and comfortable vision without any ocular complications. However, there were challenges with lens handling secondary to symptoms of post-concussion syndrome.
- On occasions, our patient would describe as “bad brain days”, she had difficulty with inserting and removing the contact lenses. On two of these occasions, the lenses were misplaced altogether. After the first time this occurred, a back-up pair of contact lenses were recommended to avoid being without the contact lenses if they were misplaced.
- Despite these obstacles, our patient has now worn the CLs successfully for 9 months and has since been able to return to work.

Discussion

- Monocular diplopia may be defined as a disorder of the visual system in which doubled images of a single object persists when the fellow eye is occluded.[5] The source of the monocular diplopia can be caused by abnormalities in various ocular structures including: the cornea, lens or retina.[5]
- In this case, the cause of monocular diplopia was determined to originate from corneal irregularity as corneal topography demonstrated corneal distortion which correlated with slit lamp findings of central EBMD.
- EBMD may present clinically with various symptoms including: decreased vision, monocular diplopia, shadowing of images, episodes of pain upon waking secondary to recurrent corneal erosion.[2]
- Due to the variability in clinical presentation, the approach to therapy should be targeted depending on the presenting symptoms.[6-9]
- A conservative approach to therapy utilizing corneal gas permeable contact lenses was trialed in this case.
- Corneal gas permeable contact lenses provide a regular ocular surface by making the front surface of the tear film spherical leading to less corneal distortion.
- Other advantages of this therapeutic option include quality of vision and ocular health and patient considerations such as of ease of handling and low cost compared to other contact lens modalities.[11]
- Although the etiology is poorly understood, post-TBI patients commonly present with concerns of photophobia and sensitivity to glare.[10]
- For symptoms of photophobia, a 30% blue tint was prescribed in spectacles and gas permeable contact lenses to provide relief.

Conclusions

- There is scarce discussion in the literature regarding cases of both EBMD and TBI; however, the TBI population may have increased sensitivity to refractive blur.[12]
- Special considerations should be given in correcting small refractive changes in this population, such as in this case, where correction of irregular astigmatism with a corneal gas permeable contact lens provided significant relief resulting in improved quality of life and assisting in return to work and activities of daily living.

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