Correcting monocular diplopia in irregular cornea secondary to herpetic keratouveitis and phototherapeutic keratectomy

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Abstract: A 71-year-old male presents with monocular diplopia secondary to recurrent herpetic keratouveitis and phototherapeutic keratectomy. This report discusses diagnosis, pathophysiology, and management of the conditions, including with the use of rigid gas permeable lens.

I. Case History

- **Patient demographic:** 71-year-old Caucasian male, Mr. L.M.
- **Chief complaint:** blurry vision, monocular diplopia, seeing “starbursts” in the right eye for the last 18 years. He is referred to the Cornea clinic for corneal transplant evaluation.
- **Ocular history:**
  - History of herpetic keratouveitis in the OD onset 1995, which reactivated s/p cataract extraction in 2000 and 2010
  - History of epithelial toxicity with Viroptic in 2000
  - S/p cataract extraction OD 2000, OS 2012
  - S/p phototherapeutic keratectomy (PTK) OD 2014
  - History of trauma when he ran into a steel beam with the left superior orbital rim, treated with PTA/LOC sutures
  - Ptosis OD
- **Medical history:**
  - Asthma
  - Chronic rhinitis
  - Sleep apnea
  - Psoriasis
  - Benign prostatic hyperplasia without urinary obstruction
  - Pulmonary fibrosis
  - Hypertension
  - Osteoarthritis
  - Chronic obstructive pulmonary disease
- **Ocular medications:**
  - Long-term therapy of prednisolone acetate 1% ophthalmic suspension QD OD
  - Refresh artificial tears prn OU
- **Systemic medications:**
  - Prednisone 20mg tab
  - Acyclovir 400mg tab
  - Albuterol 100/Ipratro 20mcg 120D po Inhaler
  - Amlodipine besylate 10mg tab
  - Benzonatate 100mg cap
- Budesonide 160/Formoter 4.5 120D mcg Inhaler
- Calcium 250mg/vitamin D 125 unit tab
- Doxycycline Monohydrate 100mg cap/tab
- Fluocinonide 0.05% ointment
- Fluticasone prop 50mcg 120D nasal inhaler
- Hydrochlorothiazide 12.5mg cap
- Hydrocodone 5mg/Acetaminophen 325mg
- Montelukast Na 10mg tab
- Pantoprazole Na 40mg ec tab
- Triamcinolone acetonide 0.1% cream
- Loratadine 10mg tab

II. Pertinent Findings
   o Clinical:
     - BCVA: OD 20/100, PH 20/40 with monocular diplopia, OS 20/20
     - Pupils: PEERL, No APD OU
     - Manifest refraction:
       - OD: +0.75 +2.25 x 020, unstable refraction
       - OS: +1.00 +1.75 x 002
     - Lids: ptosis OD>OS
     - Cornea: OD large temporal and central scar with irregular epithelium, few old keratic precipitates; OS clear
     - Keratometry:
       - OD: 42/097, 51/007
       - OS: 45/076, 46/166.
     - Pachymetry
       - OD: 323um
       - OS: 481um
     - Anterior surface topography:
       - OD: High irregular against-the-rule astigmatism
       - OS: Mild regular astigmatism
     - Lens: PCIOL OU with trace PCO OD and 2+PCO OS
   o Physical, Laboratory studies, Radiology studies: not applicable

III. Differential diagnosis
   o Primary/Leading: Corneal irregularity secondary to keratouveitis and/or PTK OD
   o Posterior capsular opacity
   o Dry Eyes
   o Retinal etiology (AMD, CSR, ERM, etc.)
   o Cortical

IV. Diagnosis and discussion
   o Diagnosis: Corneal irregularity secondary to keratouveitis and/or PTK OD
PTK treatment in Herpetic corneal scars

- The advantages of PTK in the management of corneal pathologies include precise control of ablation depth, fast postoperative recovery, ease of use, creation of a smooth base for corneal re-epithelization, and the ability to repeat treatment if required. PTK is best indicated for abnormalities in the anterior 10-20% of the corneal stroma.

- In addition to corneal dystrophies and recurrent corneal erosion, superficial herpetic corneal opacification can also be considered for PTK treatment. As seen in this case, HSV keratitis often leads to irregular stromal thinning, which limits the success of treatment outcome.

- While cases of keratectasia after laser in situ keratomileusis (LASIK) or photorefractive keratectomy (PRK) have been well documented, post PTK keratectasia is more rare. Given Mr. L.M.’s severely thin CCT and moderate correlation between the anterior corneal elevation map and the pachymetry map on Pentacam, post PTK keratectasia is considered as an explanation for Mr. L.M’s high astigmatism. However, because serial topography maps since the procedure are unavailable, it is difficult to discern whether the pathophysiology of his irregular astigmatism was secondary to the herpetic keratouveitis scarring, keratectasia after PTK, or a combination of both processes.

- In Mr. L.M., while PTK treatment may have reduced corneal opacification, it did not improve his vision due to the irregular astigmatism.

The prognosis of recurrent herpetic keratouveitis and corneal scarring

- Because of its potential to cause irreversible corneal scarring, thinning, neovascularization, and eventual blindness, recurrent herpetic ocular infections is the leading cause of infectious corneal blindness in industrialized nations. Even if treated with acyclovir, history of stromal keratitis increases the risk of recurrence.

- Given Mr. L.M.’s history of herpetic keratouveitis, penetrating keratoplasty (PKP) is not recommended due to the high rate of postoperative complications, including corneal graft rejection, herpetic recurrence in the graft, persistent epithelial defect, corneal melting, and graft failure. Furthermore, PKP is unlikely to significantly improve vision due to irregular astigmatism. The plan is to consider PKP or deep anterior lamellar keratoplasty (DALK) if all conservative measures are unsuccessful.

Future treatment options

V. Treatment/management

- Initiate rigid gase permeable (RGP) contact lens fitting

- After several modifications, a bitoric RGP is used, correcting Mr. L.M.’s vision to 20/40 and eliminating his symptom of monocular diplopia. The following parameter is used:
- CAD bitoric 44.00/+1.50, 49.00/-3.50/10.0, contamac comfort, center thickness 0.2
- Additional surgical intervention is not indicated at this moment

VI. Conclusion and Pearls
- Fitting a bitoric RGP on a patient with irregular astigmatism secondary to recurrent keratouveitis and possible post PTK ectasia significantly improves his vision in addition to eliminating his symptom of monocular diplopia.
- Clinical Pearls:
  - Because PKP in herpetic keratitis has a higher risk of postoperative complications, conservative measures like contact lens use should be attempted before considering surgical procedures.
  - Although rare, PTK ectasia may lead to severe irregular astigmatism that degrades visual quality.
  - Rigid gas permeable contact lens fitting can correct for moderate-severe amounts of corneal irregularity. However, given the number of modifications is applied to this case and the high amount of irregular astigmatism, fitting a scleral contact lens may be more effective and efficient.

VII. References