Corneal Tattoos

Abstract: Corneal tattooing has been used for cosmetic and therapeutic correction for over 2000 years. We discuss a patient who received corneal tattooing to reduce glare from multiple peripheral iridotomies secondary to phakic IOL placement.

I. Case History

• Patient demographics
  o NW, 31-year-old African American female
• Chief complaint
  o Cloudy vision OS
• Ocular, medical history
  o History of phakic IOL surgery OD 8/9/15, OS 8/10/15; Patient pursued phakic IOL surgery due to contact lens intolerance
  o History of increased intraocular pressure due to phakic IOL surgery complication OS and treated with Combigan
  o History of phakic IOL exchange OS 9/7/15
  o Laser peripheral iridotomies with overlying corneal tattoos OU
  o History of PRK OS 7/22/16
• Medications
  o None
• Other salient info
  o Unremarkable systemic history

II. Pertinent Findings

• Clinical
  o Monocular subjective refraction prior to phakic IOL surgery
    ▪ OD: -12.25 -0.25 x 085  20/20
    ▪ OS: -11.00 -0.75 x 155  20/20
  o Monocular subjective refraction post phakic IOL surgery
    ▪ OD: plano  20/20
    ▪ OS: -6.50 -1.00 x 145  20/30+2
  o Anterior segment:
    ▪ OD: black and orange tattoo pigment in the superior temporal quadrant of the corneal stroma; iris pigment floating in anterior chamber; pigmentation on anterior IOL
    ▪ OS: black tattoo pigment in the superior nasal, superior and superior temporal quadrant of the corneal stroma; iris pigment on endothelium; pigment floating in anterior chamber; pigmentation on anterior IOL

III. Differential Diagnosis

• Primary: corneal tattoos placed to reduce glare symptoms resulting from multiple laser peripheral iridotomies OU
  o Patient reports a history of phakic IOL surgery OU with complications from phakic IOL OS that resulted in multiple laser peripheral iridotomies and IOL lens exchange to relieve increased intraocular pressure. Patient reported significant
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glare symptoms from multiple peripheral iridotomies and had declined treatment with opaque contact lens as patient was financially invested in phakic IOL surgery due to contact lens intolerance. As a result, patient received therapeutic corneal tattooing to reduce glare. Patient also needed PRK enhancement due to residual myopia post phakic IOL surgery.

- Secondary: other indications for corneal tattoos
  - Iris defects
  - Corneal disfiguring scars
  - Intolerance to cosmetic contact lenses as treatment for polycoria
  - Diplopia secondary to laser peripheral iridotomy

IV. Diagnosis and Discussion

- The patient was treated with corneal tattoos for glare symptoms that were unsuccessfully treated with contact lenses due to intolerance. Orange pigment was initially used on her right eye to better match the patient’s iris color. Black pigment was placed on top when orange pigment did not provide enough glare relief.
- Glare can cause functional disability due to the contrast lowering effect from stray lights. For patients who have received laser peripheral iridotomies, they are particularly troubled by glare due to the lid margin-tear film meniscus that creates a prismatic effect to refract more rays towards the superior peripheral iridotomy. The diffraction and interference fringes of the entering rays results in glare.
- Corneal tattooing is a technique used in ancient times to mask disfiguring scars on the cornea. It was first described by the Roman physician and philosopher, Galen of Pergamum, in 150 AD. The modern use of corneal tattooing, therapeutically to reduce glare, was first introduced in the late 19th century.
- Corneal tattoo techniques:
  - Superficial corneal tattooing: epithelium debridement, scratching of superficial corneal stroma with needle, filter paper soaked with tissue marking dye placed over area, and irrigation with saline.
  - Transepithelial intrastromal micropuncture: epithelium intact, dye transepithelially injected repeatedly into the anterior stroma via beveled down tangential puncture with a needle and disposable syringe.
  - Intrastromal lamellar pocket: lamellar channels created at about half of the corneal depth by a peripheral incision and a propriety instrument. Tattoo pigment inserted through lamellar channel and blended into defective regions.
- Reported complications from corneal tattooing:
  - Inflammatory toxic reaction to ink
  - Iridocyclitis
  - Recurrent corneal erosions
  - Infection
  - Corneal ulceration
  - Granulomatous keratitis

V. Treatment and Management

- Treatment and response to treatment
Treatment for NW was to educate her on symptoms of recurrent corneal erosion and infection and to seek care if noticed.

- Continually monitor IOP and perform gonioscopy to determine patency of laser peripheral iridotomies as they are obscured by tattoo pigment.
- Monitor left eye for hyperopic creep secondary to PRK surgery.

VI. Conclusion

- A clinician encountering a patient who has received corneal tattooing should educate the patient about symptoms of corneal erosions and infections. The corneal tattooing procedure may cause injury to the basement membrane, and thus lead to corneal erosion and increased susceptibility of infection.
- Corneal tattooing may be an alternative treatment for individuals who are significantly symptomatic for glare secondary to laser peripheral iridotomies and also have contact lens intolerance.

References