



Corneal ulceration post-Lasik due to *Nocardia veterana*: Case report and review



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ARTICLE INFO

Article history:

Received 9 October 2019

Received in revised form 11 November 2019

Accepted 11 November 2019

Introduction

Laser eye correction surgery (Lasik) is a common elective procedure that has been shown to be safe and effective [1]. Although uncommon, infections post-Lasik procedure have been described [2]. Among the infecting agents causing post-lasik keratitis, *Nocardia* spp. are extremely rare [3]. In fact, *Nocardia asteroides* has been associated with post-Lasik keratitis. Here we describe a novel case of *Nocardia veterana*, causing post-Lasik keratitis in an otherwise immunocompetent patient who eventually requires a corneal transplant.

Case presentation

A 40-year-old man with no significant past medical history underwent Lasik procedure on June 15th, 2018. He was an active firefighter who suffered from myopia and he reported no injuries or problems pre-operatively. He did state that at the age of 13, a tree branch "poked" him in the eye, but denied any damage to his cornea or vision. Prior to the surgery his symptoms were blurred vision, worse with bright lights despite using eye glasses. On evaluation, he was found to be a good candidate for LASIK.

At the one week follow-up visit, he stated his vision was good with mild glare in the evenings. He had been using his steroid and antibacterial (ofloxacin) eye drops as prescribed. His eye examination was within normal limits, with good healing and no signs of infection. On the subsequent follow-up visit, 3 weeks after the procedure, the patient reported having intermittent cloudy vision for about 1 week. In addition, he also complained of feeling eye irritation, such as having a "foreign body" in his eye. This was

usually worse in the morning and made worse looking upward. The eye examination at that time revealed diffuse epithelial staining, with questionable abrasion and a possible infiltrate. The ophthalmologist recommended increasing steroid drops and restarting the ofloxacin drops. In addition, he also placed a bandage contact lens without complication and the patient reported immediate relief.

Three days later, the patient returned for follow-up and was still complaining of mild ocular pain and discomfort. He described the pain as a "raw feeling around the eye". He also continued to complain of blurry vision. At that time, he was found to have limbal redness, subepithelial opacities and central edema, a strong concern for an evolving infection. He was placed on vancomycin and azithromycin eye drops, as well as a steroid dose pak for a diagnosis of a sterile inflammation, s/p abrasion after post-Lasik. Three days later, he showed some improvement and was continued on the same therapy. One week later, his vision had improved and he had no ocular pain or complaints. Additionally, the sterile infiltrates were fading and the subepithelial densities were also decreasing. There were no signs of active infection. His antibacterial eye drops were discontinued.

A few days afterwards, just a month after the procedure, he again complained of difficulty opening his eye due to light sensitivity. At this point, he had completed two rounds of methylprednisolone dose pak and was continued on difluprednate eight times a day. The patient continued to complain of a slight irritation of his eye. At that point, due to the waxing and waning progression of the patient's symptoms and examination findings, the patient underwent a scrape and lift of the corneal flap to obtain an adequate culture two days later. During the procedure, gentle scraping and debridement was performed, followed by soaking five minutes of azithromycin drops to the underside of the flap. He was advised to avoid rubbing his eye, instructed to wear eye shields at night and prohibited from swimming. On the subsequent visit several days later, the patient developed a corneal ulcer and was taken for debridement and removal of flap. The tissue was found to

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be necrotic and revealed moderate gram-positive bacilli on the modified acid-fast stain. The patient was started on trimethoprim-sulfamethoxazole and clarithromycin orally, in addition to besifloxacin, erythromycin and amikacin eye drops. Two days after the patient experienced worsening pain, purulent drainage and cloudy vision. The affected eye is shown in the photograph below.

He was admitted to the hospital and started on intravenous imipenem/cilastin 1 g every eight hours. Although the culture of the corneal scraping was negative, a polymerase chain reaction of the specimen identified the organism *Nocardia veterana*. The species exhibited sensitivity to amoxicillin/clavulanate, clarithromycin, amikacin, imipenem and trimethoprim/sulfamethoxazole but revealed resistance to ciprofloxacin and linezolid.

The patient was continued on the imipenem/cilastin 1 g every eight hours for 4 weeks. During that time, he had improvement in light sensitivity and improved vision. He was continued on the amikacin 1 drop every one hour and trimethoprim-sulfamethoxazole 1 double strength tablet every 12 h. The patient was then referred to a corneal specialist about 5 months after the debridement and underwent a corneal replacement. At day one of follow-up, he had 20/70 vision without any signs or symptoms of pain or infection. At the subsequent follow up visits, his vision continued to improve. A month later, his vision returned to 20/25.

Discussion

Nocardia species have been known to cause keratitis after Lasik procedures but it is very rare [3]. Although *Nocardia* have been reported, *N. veterana* has not been reported to cause post-Lasik keratitis. In fact, *N. veterana* has been described in case reports of causing pulmonary infections in immunocompromised patients, such as those who have undergone solid organ transplant or in patients receiving immunotherapy for SLE, and even in an immunocompetent patient presenting with worsening chronic pulmonary disease [4]. In addition, there has been one case of disseminated disease in a 58-year-old woman involving the lungs, eye and central nervous system. That patient had been on high dose systemic steroids and methotrexate for three months prior to the presentation [5]. However, that case had cultures of the lung and cerebellum and not of the eye itself.

Therefore, this case is unique because it relates to *Nocardia veterana* initially causing keratitis, followed by a corneal ulceration after Lasik. Moreover, it also demonstrates the importance of a broad differential diagnosis including *Nocardia* infection post-Lasik procedures. In addition, it also demonstrates how aggressive this infection can become despite aggressive intervention and treatment with intravenous, oral and ophthalmic antibacterial, the patient eventually required a corneal replacement.

Nocardia veterana is a newly described species named after the veteran's hospital (Heidelberg, Victoria, Australia) where it was first isolated. This particular species is difficult to identify due to requiring restriction fragment length polymorphisms (RFLP) analysis of at least the 16S rRNA gene to recognize that the organism is a member of the *N. africana*-*N. nova*-*N. veterana* group. For this reason, it has been postulated that this organism has likely been identified as a member of the "*N. asteroides* complex" or perhaps *N. nova* if only phenotypic characteristics have been assessed [6]. *N. veterana* is most closely related to *N. vaccinnii* and *N. nova* [7]. Thankfully, according to a study, *N. veterana* is fully susceptible to ampicillin, imipenem and amikacin. However, trimethoprim-sulfamethoxazole was effective for only 75 % of isolates [8].

Conclusion

Post-Lasik keratitis should be suspected in any host who develops signs of inflammation post-Lasik surgery. Initially it may be difficult to differentiate an infectious versus inflammatory process. Infection should certainly be suspected in any patient who develops an insidious keratitis unresponsive to conventional therapy. Although rare, *Nocardia* infections, including those due to *N. veterana* should be considered in this type of patient. It is important to note that the infection should be treated aggressively since it may cause significant damage and necrosis eventually requiring a corneal replacement.

Acknowledgement

The author would like to thank Dr. Michael Endl II, MD for assistance in sharing his ophthalmology notes.

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