Case Report

Aspergillus fumigatus keratitis following laser in situ keratomileusis

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A 31-year-old woman developed pain, decreased vision, and a corneal flap infiltrate 4 days following laser in situ keratomileusis (LASIK). Treatment with topical antibiotic agents did not improve the symptoms. Approximately 2 weeks after surgery, the patient was referred to Stanford University, with 20/400 visual acuity in the left eye and a stromal infiltrate posterior to the flap. Cultures demonstrated Aspergillus fumigatus sensitive to voriconazole. The corneal ulcer progressed despite aggressive antifungal treatment, requiring amputation of the corneal flap and daily debridement. The infiltrate resolved in response to topical voriconazole, natamycin, and oral voriconazole. Aspergillus fumigatus keratitis is a rare but serious complication of LASIK surgery. The infection was successfully treated with flap amputation and daily debridement in addition to antifungal therapy.


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Although rare, corneal infection is a serious, sight-threatening complication following laser in situ keratomileusis (LASIK).1 2 The incidence of infectious keratitis is estimated to be 1:1000 after photorefractive keratectomy and 1:3000 to 1:5000 after LASIK.3 The most common causative agents are Staphylococcus aureus, Streptococcus pneumoniae, atypical mycobacterium, and, rarely, fungal species.3 4 We report a case of Aspergillus fumigatus keratitis after LASIK surgery.

CASE REPORT

A 31-year-old woman had uneventful bilateral LASIK surgery. One day postoperatively, the visual acuity was 20/20 in both eyes. On day 4, the patient noticed a foreign-body sensation, which progressed to pain, redness, and decreased vision in the left eye. On day 8, the visual acuity was 20/50 and a 1.0 mm × 1.0 mm nasal stromal infiltrate was observed posterior to the corneal flap. The corneal flap was lifted and debrided for culture (#1). Moxifloxacin 0.5% and prednisolone acetate 1% drops were prescribed, each 4 times daily. Cultures for bacteria, fungi, and acid-fast bacilli were negative, and the medications were changed to fortified cefazolin and amikacin drops alternating every hour. The visual acuity continued to deteriorate, and the patient was referred to Stanford Hospital for further treatment.

On presentation to Stanford University, 12 days after LASIK, the patient complained of sharp pain and photophobia in the left eye. On examination, the acuity was 20/400. There was a dense central stromal corneal ulcer that measured 1.7 mm × 1.7 mm, with feathery edges and overlying epithelial defect, as well as an associated mild anterior chamber reaction without hypopyon (Figure 1, A). The corneal flap was again lifted, and cultures obtained from the stromal bed of the corneal ulcer (#2) were directly inoculated onto blood, chocolate, Middlebrook, and brain–heart infusion agars, as well as chopped meat broth and viral culture media. Fortified vancomycin and amikacin drops alternating every 2 hours were prescribed.

On day 15, the visual acuity deteriorated to counting fingers at 4 feet. The corneal ulcer developed 4 new satellite infiltrates, along with marked stromal haze and a necrotic base. Because of the progressing lesion, the corneal flap was amputated and the stromal infiltrate was debrided and cultured again (#3) (Figure 1, B). Following inoculation of culture #2, mold was found on the blood and brain–heart infusion plates. Natamycin 5% and fortified voriconazole 1% drops every hour, gatifloxacin 0.3% drops 4 times a day, and oral voriconazole 200 mg twice a day were prescribed.

The isolated mold was subsequently identified as A fumigatus, with susceptibility to voriconazole (minimum inhibitory concentration0.25 μg/mL). The corneal flap biopsy, however, did not reveal any organism on culture or histopathology. Daily follow-up with ulcer-bed debridement using a sterile metal spatula for 7 consecutive days decreased the size of the infiltrate, but the stromal involvement progressed, with onset of new keratic precipitates and increased stromal haze. Over the next few weeks, the infiltrate improved to 0.2 mm × 0.2 mm and on day 40, topical natamycin and voriconazole were tapered to 4 times a day. Unfortunately, the patient developed an allergic skin rash, a known side-effect of voriconazole, which resolved when voriconazole (oral and...
topical) was discontinued. Natamycin alone proved to be sufficient for the duration of the therapy. On day 49, the stromal infiltrate resolved, leaving behind a paracentral scar and a visual acuity of 20/40 with pinhole in the left eye (Figure 1, C).

DISCUSSION
Laser in situ keratomileusis is one of the most common elective surgeries in developed countries. Infectious keratitis after LASIK is a rare but serious complication. The reports of etiologies of infectious keratitis include atypical mycobacterium, S aureus, Streptococcus viridians, fungus, Nocardia, S pneumonia, Acanthamoeba, and Pseudomonas aeruginosa. Fungal keratitis is a rare complication. Three cases of Aspergillus fumigatus infection after LASIK have been reported, one of which resulted in perforation. In fungal keratitis following LASIK, the most common species include Fusarium, Curvularia, Aspergillus, and Colleotrichum.

Diagnosis and treatment of fungal keratitis after LASIK is often delayed because of a low index of suspicion. In all reported cases, presentations to referral centers are often delayed for weeks after no response to fortified antibiotic treatment. Aggressive antifungal therapy may not be sufficient to reach a therapeutic dosage to penetrate stromal tissue. Voriconazole has been reported to be an effective triazole antifungal for fluconazole-resistant strains of fungal keratitis. The improved bioavailability of topical and oral voriconazole and the less toxic side effect profile, including photopsia, skin rash, and elevated liver functions, has made voriconazole the therapy of choice in Aspergillus infections. Marangon et al. report increased sensitivity of Aspergillus, Fusarium, and Candida to voriconazole. Our case of Aspergillus treatment supports the use of both topical and oral voriconazole in suspected cases of fungal keratitis. In addition to voriconazole, natamycin remains a preferred antifungal agent, with relatively high levels reached in the cornea. Kalavathy et al. demonstrated an improved response profile of Fusarium, Aspergillus, and Curvularia species to natamycin 5% compared with topical itraconazole 1%.

In summary, a high index of suspicion for fungal keratitis after LASIK can lead to early diagnosis and treatment. Topical steroids should be used with caution in cases with a possible infectious etiology. In cases of poor response to antifungal treatment, aggressive surgical intervention such as flap amputation and debridement may preserve vision and minimize progression of the infection.

REFERENCES

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