Epidemic and Sporadic Cases of Nontuberculous Mycobacterial Keratitis
Associated With Laser In-Situ Keratomileusis.

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This research was conducted by public health agencies. None of the authors receive
grant funding, and none have commercial interested related to this manuscript.
Abstract

**Purpose:** To report national case-finding results for nontuberculous mycobacterial keratitis and describe its association with laser in-situ keratomileusis (LASIK).

**Design:** Enhanced passive disease reporting.

**Methods:** In April 2001, we investigated a California cluster of *Mycobacterium chelonae* keratitis associated with hyperopic LASIK using a contact lens mask. To identify other possibly related cases, the American Academy of Ophthalmology e-mailed its members asking them to report recent cases of nontuberculous mycobacterial keratitis to the Centers for Disease Control and Prevention.

**Results:** Forty-three additional cases of keratitis were reported (onsets between August 2000 and June 2001). Of these, 31 occurred as part of two, unrelated LASIK-associated outbreaks. The 12 other reported cases occurred in sporadic fashion. Of the latter cases, 4 were associated with LASIK surgery. None of the reported cases were related to the *M. chelonae* cluster in California.

**Conclusion:** LASIK-associated keratitis with nontuberculous mycobacteria may be more common than previously known.
Brief Report

Recently, Chandra and associates\textsuperscript{1} reported an outbreak of \textit{Mycobacterium chelonae} keratitis associated with laser in-situ keratomileusis (LASIK). This outbreak occurred in April 2001 in California, and was associated with hyperopic surgery using a single manufacturer's soft contact lens as a corneal mask. Because these findings raised the possibility of a manufacturer-contaminated product, we initiated a nationwide case-finding effort to identify other similar cases. To facilitate this effort, the American Academy of Ophthalmology (AAO) e-mailed its members in May 2001 and asked physicians to report any recent case of nontuberculous mycobacterial (NTM) keratitis to the Centers for Disease Control and Prevention. The announcement was also published in EyeNet magazine in July 2001. A similar message was sent via an e-mail list-server to microbiologists throughout the country. With this report, we summarize our findings and provide further information about these infections and their association with LASIK.

Between May and October 2001, 43 cases of keratitis were reported with onset between August 2000 and June 2001. Of these, 31 occurred as part of two, unrelated outbreaks associated with LASIK. The 12 other reported cases occurred in sporadic fashion. Of the latter cases, 4 were associated with LASIK surgery (Table). None of the reported cases were related to the \textit{M. chelonae} cluster in California.
Of the two additional clusters identified, one involved seven persons in Texas who developed corneal infiltrates with *M. szulgai* 6 weeks to 6 months after LASIK surgery. The infections were traced to a contaminated hospital ice machine (using tap water) from which a surgeon obtained ice to chill balanced salt solution used during the procedure. The other cluster affected 24 persons in Georgia who developed post-LASIK keratitis clinically suggestive of NTM infection. Two of these persons had direct corneal smears positive for acid-fast bacilli and corneal cultures that yielded *M. gordonae*. Since these isolates were of different strains, the role of *M. gordonae* in this cluster could not be definitively determined.

Our findings, coupled with an increasing number of similar case reports, suggest that LASIK is a common risk factor for the development of NTM keratitis. The cases identified by the AAO alert indicate that the California cluster described previously was not unique, and that LASIK-associated NTM infections are more widespread than previously appreciated. To our knowledge, the clusters from California, Texas, and Georgia are the only documented infectious outbreaks of any kind associated with LASIK in the United States. Because NTM are ubiquitous in soil and water (including tap water), they may cause infection when surgical instruments or clinical devices are exposed to contaminated water, ice, or other solutions. Ophthalmologists should be aware of these LASIK-associated NTM infections, particularly as they may have unique diagnostic and treatment features and the ability to cause severe morbidity in patients with previously good vision. To decrease the risk of such infections, surgeons should ensure that non-sterile solutions are not introduced into surgical procedures.
References


Table. Sporadic Cases of Nontuberculous Mycobacterial Keratitis (n=12)

<table>
<thead>
<tr>
<th>Case</th>
<th>Organism</th>
<th>Outcome</th>
<th>Reported pre-existing factor(s) associated with infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><em>M. chelonae</em></td>
<td>Unknown</td>
<td>LASIK</td>
</tr>
<tr>
<td>2</td>
<td><em>M. chelonae</em></td>
<td>Unknown</td>
<td>LASIK</td>
</tr>
<tr>
<td>3</td>
<td><em>M. terrae</em></td>
<td>Corneal graft</td>
<td>LASIK</td>
</tr>
<tr>
<td>4</td>
<td><em>M. abscessus</em></td>
<td>Corneal graft</td>
<td>LASIK</td>
</tr>
<tr>
<td>5</td>
<td><em>M. chelonae</em></td>
<td>Endophthalmitis</td>
<td>RK</td>
</tr>
<tr>
<td>6</td>
<td><em>M. chelonae</em></td>
<td>Unknown</td>
<td>Penetrating Keratoplasty</td>
</tr>
<tr>
<td>7</td>
<td><em>M. chelonae</em></td>
<td>Corneal graft</td>
<td>Topical cortico-steroid treatment of corneal graft rejection. Patient developed secondary infection at site of broken suture.</td>
</tr>
<tr>
<td>8</td>
<td><em>M. chelonae</em></td>
<td>Corneal graft</td>
<td>Epithelial defect while wearing contact lens.</td>
</tr>
<tr>
<td>9</td>
<td><em>M. gordonae</em></td>
<td>Corneal graft</td>
<td>Epithelial defect secondary to herpes zoster ophthalmicus. History of immunosuppression (oral cortico-steroids, lymphoma).</td>
</tr>
<tr>
<td>10</td>
<td><em>M. chelonae</em></td>
<td>20/25*</td>
<td>Epithelial defect. History of diabetes mellitus.</td>
</tr>
<tr>
<td>11</td>
<td><em>M. gordonae</em></td>
<td>20/80*</td>
<td>Epithelial defect.</td>
</tr>
<tr>
<td>12</td>
<td><em>M. chelonae</em></td>
<td>Corneal graft</td>
<td>Epithelial defect. History of exposure keratopathy.</td>
</tr>
</tbody>
</table>

LASIK = laser in-situ keratomileusis; RK = radial keratotomy
* Best corrected visual acuity