Endophthalmitis is a serious complication of intraocular surgery. Following glaucoma filtering surgery, the frequency of endophthalmitis after partial-thickness sclerotomy is in the range of 0.1 to 1.5% (9, 10, 17, 18). Late onset of endophthalmitis may present several years after surgery and may progress very rapidly. Several factors have proved to increase the risk of developing endophthalmitis associated with filtering blebs. Among these are inferiorly positioned trabeculectomy, an episode of blebitis, diabetes mellitus, and the use of anti-proliferative agents, usually 5-fluorouracil or mitomycin, concomitantly with surgery (7, 10, 14).

*Moraxella nonliquefaciens*, a commensal organism of the upper respiratory tract, is generally considered to have low pathogenic potential. We report here two cases of severe endophthalmitis occurring 9 years and 2 months after glaucoma filtration surgery, respectively. Apart from sulfonamide, very low MICs were recorded for several antibiotics tested. Identification was based on phenotypic characteristics in combination with sequencing of the 16S rRNA gene.

**Case 1.** A 78-year-old man was admitted on 2 September 1999 with a 1-day history of purulent discharge and 12 h of decreased visual acuity in his right eye. In 1990 he had undergone trabeculectomy, and in 1994 cataract surgery had been performed. On admission visual acuity was light perception, intraocular pressure was 32 mm Hg, the bulb was hyperemic, and the cornea was edematous. The filtering bleb was pale, and a grade III reaction in the anterior chamber and vitreous clouding were observed. No red reflex was seen. Vitreous and anterior chamber taps were performed. Vancomycin (100 μg) and gentamicin (100 μg) were administered intravitreally, and cefturoxime (200 μg) was instilled into the anterior chamber. The patient received intravenous gentamicin (80 mg every 8 h) and vancomycin (500 mg every 12 h) as well as oral prednisolone. Cefuroxime and gentamicin eyedrops were administered topically. Altogether, the patient received three intravitreal injections of vancomycin and gentamicin. On one occasion, bleeding in the anterior chamber occurred, probably due to an increased bleeding tendency, as he was receiving warfarin prophylaxis against cerebral thromboembolism. A pupillary membrane developed, and he never regained a visual acuity of more than light perception. Culture of the anterior chamber fluid grew gram-negative coccobacillary organisms (strain 96127/99), but culture from the vitreous humor and the conjunctiva yielded no growth.

**Case 2.** A 76-year-old man was admitted on 20 December 2000 with a history of acute blurred vision of his right eye of a few hours’ duration. On the day prior to admission, he had observed purulent discharge. Cataract surgery had been performed in 1996. Two months prior to the actual episode, he had undergone a trabeculectomy with instillation of mitomycin C subconjunctivally. The visual acuity of his right eye was hand motions, and the intraocular pressure was 13 mm Hg. A diffuse edema of the palpebra was noted, mucus was present in the cilia, and the cornea appeared edematous. The filtering bleb was broadbased, heavily injected except at the 2 o’clock position, where it was pale, thin, and probably distended with pus. The reaction in the anterior chamber was heavy with clouding and fibrinous exudates. No red reflex was observed, and the fundus could not be visualized. An ultrasound scan, however, demonstrated dense clouding of the vitreous humor, in particular inferiorly and temporally. Vitreous and anterior chamber taps were performed, vancomycin (100 μg) and gentamicin (100 μg) were administered intravitreally, and cefturoxime (200 μg) was instilled into the anterior chamber. This procedure was repeated once 2 days later. The patient also received topical treatment with gentamicin and cefturoxime eyedrops, as well as oral prednisolone. He was discharged after 13 days. The visual acuity was only light perception, and after 6 months it was no better than hand motions. A Gram stain of the vitreous humor collected on admission demonstrated numerous polymorphonuclear leukocytes and gram-variable, mainly gram-negative, small rods. Culture from the anterior chamber and the conjunctiva yielded no growth, but in culture from the vitreous humor there was abundant growth of a gram-negative coccobacillary organism (strain 141365/00).
Microbiology. In both cases the specimens were immediately transported to the laboratory and processed within 6 h after being taken.

A phenotypic characterization of the two M. nonliquefaciens strains is given in Table 1. By using API NH (bioMerieux, Marcy l’Étoile, France) both strains generated profile 0010, interpreted by the database (version 2.0) as excellent identification of Moraxella (subgen. Branhamella) catarrhalis (percent identity, 99.9%; T index value = 1.00) but suggesting the possibility of other Moraxella spp. DNase positivity has been used as a main phenotypic characteristic for distinguishing M. catarrhalis from other Moraxella spp. (3). After 48 h of growth, the DNase test agar (Difco) was flooded with 1 M HCl. A narrow zone of incomplete clearing around the growth was observed for one of the isolates (Table 1), while M. catarrhalis produced a wide zone of complete clearing of the agar.

Neither of the two strains produced beta-lactamase. MICs as determined with E-test strips (AB Biodisk, Solna, Sweden) by using Mueller-Hinton agar (Difco) with 5% horse blood are shown in Table 2. Apart from the MIC of sulfonamide, very low MICs were recorded.

The 16S rRNA gene was amplified by PCR, and the amplicon (approximately 1,500 bp) was purified from the agarose gel by using the QIAquick Gel Extraction Kit (Qiagen, Hilden, Germany). Analysis of the whole nucleotide sequence was performed by using the MicroSeq Full Gene 16S rDNA Bacterial Sequencing Kit with an automated DNA sequencer (ABI PRISM 310 Sequencer) (both from Perkin-Elmer Applied Biosystems, Foster City, Calif.). The resulting 1,445-bp sequences of the two strains differed by only 1 nucleotide. By a BLAST comparison (1) with sequences available in GenBank, >99.7% identity to 10 published M. nonliquefaciens sequences was found.

The microscopic morphology and growth characteristics of the two strains closely resemble the description of M. nonliquefaciens (2). Identification of Moraxella spp. other than M. catarrhalis is not always straightforward. The microscopic morphology (coccobacilli, not diplococci) and soft, glistening colonies (as opposed to dry colonies that can be swept intact over the agar surface) are atypical for M. catarrhalis, the species suggested by the API NH database. To our knowledge, weak DNase activity, as observed for one of the present strains, has not been reported for M. nonliquefaciens. By combining phenotypic characteristics and 16S rRNA gene sequencing, we consider the identification of both strains as M. nonliquefaciens to be reliable. The main natural habitat of M. nonliquefaciens is most probably the human nasal cavity, and this organism has mostly been isolated from respiratory and ocular sites (6).

We are aware of only six published cases of endophthalmitis caused by M. nonliquefaciens. The first report, by Ebright in 1981, concerned an immunocompromised patient believed to have contracted the infection through minor trauma of the cornea from a contact lens (5). For the other five patients,
trabeculectomy had been performed, with an interval from surgery to endophthalmitis ranging from 2 months to 15 years (11, 12, 15, 16). Our two cases of late-onset endophthalmitis caused by \textit{M. nonliquefaciens} after glaucoma filtering surgery clearly demonstrate the devastating outcome of this infection, even though the causative organism is generally considered to be of low virulence and the antibiotics given are considered adequate. In both cases the course was very rapid, with acute onset of decreased vision. Both patients had noted a purulent discharge from the conjunctiva within the 24 h prior to onset of endophthalmitis. For our two patients, \textit{M. nonliquefaciens} was not detected in conjunctival cultures. A poor correlation between conjunctival cultures and intraocular cultures has been observed previously. Of 18 patients for whom conjunctival and intraocular cultures yielded microorganisms, only 5 had the same bacterium cultured from the conjunctiva and the aqueous humor (12), whereas in another study 4 of 16 cases showed concordance between conjunctival and intraocular cultures (4). It is reasonable, therefore, to infer that organisms entering intraocularly through the filtering bleb may be present only transiently on the bleb surface. It is also important to realize that conjunctival cultures in this setting may be misleading. Awareness of the risk of endophthalmitis in patients who have undergone filtering-bleb surgery is necessary.

**Nucleotide sequence accession numbers.** The nucleotide sequences of the 16S rRNA genes of strains 96127/99 and 141365/00 have been given GenBank accession numbers AF443790 and AF443789, respectively.

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**REFERENCES**


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