In vitro antibiotic susceptibility of preoperative normal conjunctival bacteria

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Abstract

Purpose To determine the antibiotic susceptibility of preoperative conjunctival bacterial flora.

Methods Antibiotic susceptibility of conjunctival bacterial strains isolated from 142 patients undergoing intraocular surgery was determined using the Kirby–Bauer disc diffusion technique. χ^2 statistical analysis was performed.

Results Among the 116 bacteria isolated, 95 (82%) were coagulase-negative staphylococci (CNS). Most (>75%) of them were susceptible to vancomycin, minocycline, aminoglycosides, gatifloxacin, levofloxacin, and moxifloxacin. Approximately one-half of CNS was resistant to erythromycin and azithromycin. Over 90% of streptococci were susceptible to levofloxacin, moxifloxacin, and gatifloxacin.

Conclusions Fluoroquinolones, specifically gatifloxacin, levofloxacin, and moxifloxacin continue to provide broad-spectrum coverage against common conjunctival bacterial flora.

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Keywords: antibiotics; bacteria; conjunctiva; fluoroquinolones; susceptibility

Introduction

Topical antibiotics are commonly prescribed in the preoperative period to possibly reduce the risk of infections following intraocular surgery.¹ The purpose of this study is to provide an update on antibiotic susceptibility of normal ocular surface bacterial flora isolated from patients undergoing anterior segment intraocular surgeries.

Materials and methods

Baseline conjunctival cultures were obtained from the operated eyes of patients who underwent anterior segment intraocular surgery at Stanford University from February 2004 to January 2005. The Kirby–Bauer disc diffusion technique was conducted in accordance with the guidelines of National Committee for Clinical Laboratory Standards (NCCLS). Statistical analysis was performed using χ^2 test with StatsDirect software program (StatsDirect Software, Cheshire, UK).

Results

A total of 95 strains of coagulase-negative *Staphylococcus* (CNS), 13 *Streptococcus* species, 6 *Staphylococcus aureus* (*S. aureus*), 4 *Propionibacterium acnes*, and 3 Gram-negative rods (none were *Pseudomonas*) were isolated from 142 eyes of 142 patients.

The results of the antibiotic susceptibility tests for the 95 CNS strains are summarized in Figure 1. Among the commercially available antibiotics, the aminoglycosides and broad-spectrum fluoroquinolones have the highest susceptibility rates, whereas only about 50% of CNS were susceptible to the macrolides, such as erythromycin and azithromycin.

Antibiotic susceptibility results for *Streptococcus* species are summarized in Figure 2. All were susceptible to vancomycin. Among the fluoroquinolones, there were significant differences ($P=0.0048$) between ciprofloxacin and ofloxacin (31% susceptibility) compared with levofloxacin, gatifloxacin, and moxifloxacin (92% susceptibility). Up to two-third of the streptococci were resistant to the aminoglycosides and macrolides.

None of the six *S. aureus* isolated were resistant to the fluoroquinolones or aminoglycosides except neomycin. One out of six was resistant to erythromycin and azithromycin.

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Figure 1 Susceptibility pattern of coagulase-negative *Staphylococcus* ($n = 95$).

Figure 2 Susceptibility pattern of *Streptococcus* species ($n = 13$).

Discussion

The results of the current study are similar to the published results from Brazil, Europe, and the United States.²⁻⁴ In contrast, Harper *et al*⁵ demonstrated high resistance to fluoroquinolones among CNS isolated from

patients with endophthalmitis. In our study, among the commercially available antibiotics, aminoglycosides and broad-spectrum fluoroquinolones have the highest susceptibility rate for all CNS isolated. Streptococci are commonly resistant to ciprofloxacin and ofloxacin, but highly susceptible to gatifloxacin, levofloxacin, and moxifloxacin. The broad-spectrum fluoroquinolones, specifically gatifloxacin, levofloxacin, and moxifloxacin continue to provide broad-spectrum coverage against common ocular bacterial flora in patients undergoing ocular surgery.

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