

# The pattern of existing conjunctival flora and their antibiotic sensitivity among patients undergoing cataract surgery

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## Abstract

**Introduction:** Studies have shown that the causative organisms in post-operative endophthalmitis are commensals of the conjunctival sac and that fourth-generation fluoroquinolones are useful in pre operative chemoprophylaxis.

This interventional study was done to determine the pattern of existing conjunctival flora, their antibiotic sensitivity pattern and the effectiveness of the fourth generation fluoroquinolones in pre-operative antibiotic prophylaxis Study carried out at Eye Unit, Base Hospital, Horana and Microbiological Department, National Institute of Health Sciences, Kalutara, Sri Lanka

**Materials and methods:** This interventional study was carried out among randomly selected total of 200 patients admitted for routine cataract surgery to Eye Unit, Base Hospital, Horana, allocating equally matched 100 patients per group. Pre-operative moxifloxacin administered only to the intervention group. Conjunctival swabs were cultured and studied for isolation of organisms and antibiotic sensitivity patterns compared.

**Results:** Organisms were isolated from 5% of patients in the intervention group and 27.5% in the non intervention group showing a statistically significant difference.

**Conclusions:** This study shows the beneficial effect of pre operative antibiotic prophylaxis with fourth generation fluoroquinolones in reducing the conjunctival commensal flora.

**Key words:** Pre-operative antibiotics prophylaxis, conjunctival commensal flora, endophthalmitis, fourth generation fluoroquinolones.

## Introduction

Endophthalmitis remains one of the most feared complications of intraocular surgery<sup>1</sup> despite improved antibiotic prophylaxis and advances in surgical technology. Prevention of endophthalmitis can be

achieved by meticulous clinical evaluation of pre-operative risk factors of the patient and accurate surgical procedure and appropriate antibiotic therapy. In this context rational antibiotic prophylaxis during pre-operative, operative and postoperative periods is one of the first priorities in the prevention of endophthalmitis. But there is no consensus regarding the pre-operative use of antibiotics, while post operative antibiotics are used in almost all patients

## Background

Cataract surgery has benefited from great technical advances but no agreement exists as to the optimal preoperative medical management of infection with regard to prophylactic antibiotic therapy. The incidence of endophthalmitis after cataract surgery is approximately 0.1% (1 in 1000 operations).

Retrospective data from the United States is available describing a low incidence of endophthalmitis when using fourth-generation fluoroquinolones as chemoprophylaxis. Studies have shown that the causative organisms were predominantly from the commensal flora of the conjunctival sac. Cultures of lids, lashes, and conjunctivae have demonstrated colonization with potentially pathogenic *Staphylococcus epidermidis*, *Staphylococcus aureus*, *Streptococcus*, or other organisms in approximately 75% of eyes.

The study was conducted at the Eye Unit of the Base Hospital, Horana, Sri Lanka to identify the prevalence of conjunctival commensal organisms of pre-operative patients.

The objective of the study was to determine the pattern of existing conjunctival flora and their antibiotic sensitivity pattern in patients undergoing cataract surgery and to determine the effectiveness of the currently used method of pre-operative antibiotic prophylaxis in reducing the existing conjunctival flora

Although many studies have been carried out pertaining to rational use of prophylactic antibiotics

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in relation to cataract surgery in some of the developed countries, to our knowledge, there have been no studies done in Sri Lanka in the medical literature that support the use of any topical prophylactic antibiotics before or after cataract surgery. Such data would be of great help in the formulating guidelines for rational usage of antibiotics for ophthalmologists in Sri Lanka.

### Methodology

All the patients who underwent cataract surgery at the Eye Unit, Base Hospital, Horana, Sri Lanka during the period between 1st September 2012 to 30th June 2013. Patients with clinically detectable infections of lids or conjunctivae were excluded from the study.

Patients who were treated with prophylactic antibiotics (other than the pre-operative prophylactic therapy) over the past 48 hours or systemic antibiotics over the past one month were also not taken for the study.

Once the informed consent was obtained all eligible patients were listed according to date of registration and allocated to either the interventional or control group using simple randomization.

### Ethical clearance details

Ethical clearance was obtained from the Ethical Review Committee of University of Kelaniya.

### Materials and methods

A detailed clinical history was obtained by a trained interviewer using an internally validated questionnaire which included particulars regarding recent antibiotic use. 100 patients selected by simple randomization were prescribed pre operative moxifloxacin eye drops four times a day for 3 days. Eye drops were self administered prior to hospital admission for surgery. Swabs were collected from the lower fornix within 24 hours after admission of the patient and before preliminary pre-operative preparations.

A similar procedure was followed in the selection of non-interventional group of the other 100 patients and they were not given the pre operative antibiotic therapy. Swabs were taken from all study subjects in a similar manner. All collected swabs were directly cultured into blood agar plates immediately and plates were transferred as instructed for microbiological studies to the microbiological unit, at National Institute of Health Science (NIHS), Kalutara.

Standard disc diffusion method was used to identify isolated organisms and sensitivity patterns were reported for commonly used predetermined set of topical antibiotics namely; gentamycin, tobramycin, ciprofloxacin, ofloxacin, gatifloxacin and moxifloxacin.

The cultured organisms from the conjunctival swabs were noted and compared between the two groups of patients who received and did not receive pre-operative prophylactic antibiotics. The antibiotic sensitivity patterns for routinely used topical antibiotics were assessed.

### Results

In the group that received prophylactic antibiotics, there were 59 (58.4%) females and 42 (41.6%) males. In the control group, there were 52 (53.6%) females and 45 (46.4%) males. There was no statistically significant difference between the two groups with regard to the sex distribution.

The mean age of the group treated with antibiotics was 67.74 years, while that of the control group was 67.75 indicating no statistically significant difference in the mean age of the two groups.

In the intervention group that received prophylactic antibiotics only 2 patients had received oral steroids while none of the patients in the control groups had received oral steroids. There was no statistically significant difference between the two groups with regard to the use of oral steroids.

In the intervention group that was treated with antibiotics 2 patients had received treatment with topical steroids (non ophthalmic) while none of the patients in the control group had received topical steroids. There was no statistically significant difference between the two groups with regard to the use of topical steroids.

7.9% of patients in the intervention group had been treated with steroid inhalers while 7.2% of patients in the control group had received steroid inhalers. With regard to the use of steroid inhalers there was no statistically significant difference between the two groups. 15 (14.5%) patients in the intervention group had diabetes mellitus while 9 (9.3%) patients in the control group had diabetes mellitus.

There was no statistically significant difference between the two groups with regard to having diabetes mellitus.

### Statistical analysis

Pearson Chi square Test was used to compare the difference between intervention and non intervention groups with regard to the presence of organisms and the distribution of other outcome modifiers such as age, sex and steroid therapy. Comparison of intervention and non-intervention groups of prophylactic antibiotic therapy 5% of patients in the interventional group had organisms cultured from their eyes while 27.8% of patients in the control group had organism cultured.

This was considered statistically significant.

**Table 1. Frequency distribution of growth of organisms between treatment and control groups**

Comparison of intervention and non-intervention groups of prophylactic antibiotic therapy			Culture status of growth of organisms		Total
			Growth plus	No growth	
Treated with moxyfloxacin	Intervention group	Count	5	96	101
		Percentage	5.0%	95.0%	100.0%
	Non intervention group	Count	27	70	97
		Percentage	27.8%	72.2%	100.0%
Total		Count	32	166	198
		Percentage	16.2%	83.8%	100.0%

Pearson Chi Square = 19.12 df = 1 p < 0.0000

**Table 2. Distribution of isolated conjunctival organisms of treatment and control groups**

		<i>Coagulase negative staph</i>	<i>Coliforms</i>	<i>Moraxella</i>	<i>No growth</i>	<i>Pseudomonas</i>	<i>Streptococcus</i>
Intervention Group	count	2	3	0	96	0	0
	% treated with moxy	2.0%	3.0%	0%	95%	0%	0%
Non-intervention Group	count	9	15	1	70	1	1
		9.3%	15.5%	1.0%	72.2%	1.0%	1.0%
Normal	count	11	18	1	166	1	1
		5.6%	9.1%	0.5%	83.8%	0.5%	0.5%

**Distribution of isolated conjunctival organisms of treatment and control groups**

Considering the organisms isolated from the conjunctival samples in both groups the predominant organism in both groups were shown as coliforms (9.1%) with 3% in the study population and 15.5% in the control group. Coagulase negative staphylococci

came next with 2% patients in the study group and 9.3% in the control group and 5.6% in the total population.

Moraxella, pseudomonas and streptococcus showed equal presence being absent in the treatment group and each making 1% in the study population and 0.5% in the total sample.

**Table 3. Distribution of antibiotic sensitivity pattern of isolated organisms**

Type of organism	Number of patients	Genta-mycin	Tobra-mycin	Chloram phenicol	Cipro	Oflox	Gati	Moxi	Cloxa
Coliform	18	S	S	S	S	S	S	S	S
Coagulase neg staph	6	S	S	S	S	S	S	S	S
Coagulase neg staph	2	S	S	S	R	R	R	R	R
Coagulase neg staph	2	S	S	S	S	S	S	S	R
Coagulase neg staph	1	S	R	R	S	S	S	S	-
Moraxella	1	S	R	R	S	S	S	S	
Pseudomonas	1	S	S	-	S	S	S	S	

### Antibiotic sensitivity pattern

The commonest organisms isolated were the coliforms which was found in 18 patients (9%). The next common was coagulase negative staphylococci isolated from 11 patients (5.6%). *Moraxella* was isolated from one patient (0.5%). *Pseudomonas* and streptococci was also isolated from one patient each.

When observing the antibiotic sensitivity of the organisms, all the coliforms isolated were sensitive to gentamycin, tobramycin, chloramphenicol and the 4 fluoroquinolones namely ciprofloxacin, ofloxacin, gatifloxacin and moxifloxacin.

In the coagulase negative staphylococci isolated; different antibiotic sensitivity patterns were noted. Organisms isolated from 6 patients were sensitive to gentamycin, tobramycin, chloramphenicol, cloxacillin and to all 4 of the fluoroquinolones.

Coagulase negative staphylococci isolated from 2 patients were sensitive to gentamycin, tobramycin and chloramphenicol while resistant to all 4 fluoroquinolones and cloxacillin. Organisms isolated from 2 other patients were sensitive to all the above drugs tested while resistant to cloxacillin. Isolates from one patient was sensitive to gentamycin, and all 4 fluoroquinolones while resistant to tobramycin, chloramphenicol and cloxacillin.

*Moraxella lacunata* isolated from a single patient was sensitive to gentamycin and all 4 fluoroquinolones.

While *Pseudomonas aeruginosa* isolated from a single patient was sensitive to gentamycin, tobramycin and all 4 fluoroquinolones.

### Discussion

This interventional study compared the commensal organisms in the conjunctival sac of patients who received pre operative topical moxifloxacin for 3 days with the controls.

It also assessed the antibiotic sensitivity of organisms cultured from the conjunctival samples for the commonly used topical antibiotics. There was no statistically significant difference between the interventional and control groups with regard to age distribution, sex distribution or presence of diabetes mellitus.

There was no statistically significant difference between the two groups with regard to the use of oral, inhaled or topical steroids. 5% of patients in the interventional group had organisms cultured from their eyes while 27.8% of patients in the control group had organism cultured.

In this study the predominant organisms were coliforms in both interventional and non interventional groups. (9.1%) with 3% in the interventional group and 15.5% in the control group. Coagulase negative staphylococci came next with 2% patients in the study

group and 9.3% in the control group and 5.6% in the total population.

In most of the studies conducted to isolate conjunctival flora and the commonest organisms reported were coagulase negative staphylococci, followed by staphylococcus aureus.

Coliforms can be acquired in a hospital setting. These patients were admitted and remained in the hospital up to 24 hours before the culture swabs were taken. One possible explanation is that these may have colonized the conjunctiva during this period. If conjunctival swabs were cultured from other inward patients not included in the study this could have been confirmed.

The other possibility is that they may have acquired the organisms during a recent hospital stay. This information was not requested in the questionnaire. Manipulation of the eye by routine examination, tonometry and irrigation can temporarily change bacteria isolated from the conjunctiva<sup>2,3</sup> as shown by certain studies. This is another possible explanation. Although instillation of dilating drops and other pre operative procedures were not performed intraocular pressure assessment was done on all patients and this may have had an effect on the results.

## Conclusion

It appears that the pre-operative use of topical moxifloxacin for 3 days causes a statistically significant reduction in the conjunctival commensal flora. Most organisms isolated from the conjunctival sac are sensitive to commonly used topical antibiotics.

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