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Alteration of Bacterial Population upon Endoscopic Nasolacrimal Duct Intubation in Japanese Patients

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Abstract

Background: We retrospectively observed the results of bacteriological culture of the conjunctival swab samples before and after endoscopic nasolacrimal duct intubation to know the effect of nasolacrimal drainage recover on conjunctival contamination.

Methods and Findings: 33 sides in 27 patients were included in the study. They were followed for three or more months after successful endoscopic nasolacrimal duct intubation in Department of Ophthalmology, Wakayama Medical University Hospital, Wakayama, Japan from July, 2015 to June, 2016. Bacteriological culture of the conjunctival swab samples were performed before operation and 3 months after removal of the tube of successful intubation.

Conclusions: Bacteriological culture turned to negative in 5 of 9 sides (55.6%) at 3 months after removal of the tube post-successful intubation of nasolacrimal duct obstruction or stenosis. Population of *Staphylococci* and *Candida* was eliminated in conjunctiva after the successful treatment, while *Corynebacterium* and *Streptococci* were survived. Recovery of nasolacrimal drainage system was effective in diminishing bacterial growth in conjunctiva, although the effectiveness was limited.

Keywords: Nasolacrimal intubation; Bacterial contamination; Conjunctiva; Endophthalmitis

Abbrevations

MSSA: Methicillin-Susceptible *Staphylococci aureus*

Introduction

The incidence of infectious endophthalmitis post-cataract surgery reportedly ranges 0.04%-0.075% [1-3]. Higher rates of obstruction on nasolacrimal duct as also reported among patients who developed infectious endophthalmitis post-cataract surgery [4,5]. Eighty-two percent of microorganisms isolated from the intraocular space in eyes of infectious endophthalmitis are originated from conjunctival bacterial flora as judged from the results of genetic analysis [6], indicating the critical roles of conjunctival bacterial population in the development of post-operative intraocular infection. It is controversial whether the anterior chamber could be contaminated with bacteria in conjunctiva through incision during or after cataract surgery. Contaminated tear fluid could be sucked in to the anterior chamber through corneal/scleral incision post-cataract surgery [7]. Regardless the route of bacterial contamination, these reports suggest that obstruction of the nasolacrimal duct might cause bacterial contamination in the lacrimal sac and conjunctiva even without obvious dacryocystitis. Therefore, it is beneficial to check for the presence of nasolacrimal duct obstruction prior to cataract surgery. For this purpose, in our institution we routinely perform of nasolacrimal duct syringing in patients prior to intraocular surgery and perform bacteriological examination in conjunctival swab samples in all the patients with nasolacrimal duct obstruction regardless the presence or absence of dacryocyctitis. The patients with obstruction or stenosis of nasolacrimal system chose to receive either topical antibiotics or surgical treatment of nasolacrimal duct obstruction, e.g., endoscopic nasolacrimal duct intubation in our pre-intraocular surgery protocol. Dacryocystorhinostomy is reportedly followed by reduction of bacterial contamination in conjunctiva [8]. However, alteration of bacteriological examination pre- and post-nasolacrymal drainage intubation was not reported. In the current study we therefore retrospectively observed the results of bacteriological culture of the conjunctival swab samples before and after endoscopic nasolacrimal duct intubation.

Methods

This retrospective study was approved by Institutional Review Board of Wakayama Medical University, Wakayama, Japan. The study included the patients who had been followed for three or more months after successful endoscopic nasolacrimal duct intubation in Department of Ophthalmology, Wakayama Medical University Hospital, Wakayama, Japan from July, 2015, to June,

2016. Surgery was performed in each patient by one well-trained surgeon (MK). The subjects were 33 sides in 27 patients. The mean age of patients was 69.2-year-old (range 15 to 84-year-old). The types of the patient condition were obstruction or stenosis (narrowing) of nasolacrymal duct (16 or 7 sides, respectively), obstruction of common canaliculus (5 sides), obstruction of a canaliculus of either upper or lower eyelid (3 sides) and punctal closure of both upper and lower eyelids. After bacterial examination in the conjunctival swab sample the patient with nasolacrimal duct obstruction received topical 1.5% ofloxacin and 0.5% topical cefmenoxime hydrochloride for 3 days just prior to the duct intubation. The operation was performed under local anesthesia. Obstruction or stenosis of the tear drainage system was opened and an 18-guage sheath (Safuro needle of 64 mm in length) was introduced under with the assistance of nasolacrymal endoscopy and nasal endoscope. Then a PF catheter® was placed with the technique of Sheath-guided-intubation (SGI). After the surgery the patients received topical 1.5% ofloxacin and 0.1% fluorometholone for one month. Nasolacrimal syringing with normal saline was performed every two or three weeks until removal of the tube. The tube was removed three or two months in patients with abnormal ductal system or lacrimal canaliculus, respectively. And after removing the tube, nasolacrimal syringing with normal saline was performed every month for 3 months. Bacteriological culture of the conjunctival swab samples was performed at three months after removing the tube.

Results

Bacteria culture was detected in 9 of 33 sides with nasolacrimal duct obstruction or stenosis (2 of 16 sides with nasolacrimal duct obstruction, 1 of 7 sides with nasolacrimal duct stenosis, 3 of 5 sides with common canaliculus obstruction, 1 of 3 sides with canaliculus obstruction and 2 of 2 sides with punctal closure of both upper or lower eyelids). Bacteriological culture turned to negative in 5 of 9 sides (55.6%) at 3 months after removal of the tube post-successful intubation of nasolacrimal duct obstruction or stenosis. The microorganism detected pre- and post-intervention for nasolacrymal apparatus abnormalities are shown in the **Table 1**.

Table 1: The microorganism detected pre- and post-intervention for nasolacrymal apparatus abnormalities.

		Before incubation		After incubation
Gram-positive cocci	Coagulase-negative *Staphylococci* (levofloxacin-resistant)	2	→	0
	Methicillin-susceptible *Staphylococci aureus* (MSSA)	2		0
	Streptococci species	4		2
Gram-positive bacilli	*Corynebacterium* species	5		3
Fungus	*Candida parapsilosis*	1		0
	Total	14		5
Microorganism detected decreased from 14 strains to 5 strains (64.3%) at 3 months after removal of the tube post-successful intubation of nasolacrimal duct obstruction or stenosis.				

Although nasolacrimal intubation is effective in eliminating bacteria from conjunctiva, it is to be noticed that commensal bacteria or others could survive after the treatment prior to following cataract surgery.

Discussion

We showed herein that bacteriological culture turned to negative in 5 of 9 sides (55.6%) at 3 months after removal of the tube post-successful intubation of nasolacrymal duct obstruction or stenosis.

In the current cases *Staphylococci* species (levofloxacin-resistant coagulase-negative *Staphylococci* and methicillin-susceptible *Staphylococci aureus*) and *Candida*, critical microorganisms as pathogens of acute post-operative endophthalmitis, were eliminated following the intubation. It was reported that nasolacrymal duct obstruction promotes growth of Gram-negative bacteria in conjunctiva [9,10]. It is to be noted that levofloxacin-resistant microorganism was well treated by nasolacrimal intubation, clearing indicating that post-operative one-month application of topical 1.5% levofloxacin. On the other hand, *Streptococci* species bacteria survived after the treatment in two of four cases, although the surgical intervention to the impaired nasolacrimal drainage system was recognized as effective to reduce the bacterial colonization in the conjunctival sac/tear fluid.

After two month-antibiotic-free duration post-tube removal commensal bacteria of *Corynebacterium* was still detected in 3 of 5 eyes with positive culture before the intubation. We previously reported that 94.4% of cases of nasolacrymal duct obstruction with positive culture for bacteria in conjunctival swab samples turned to negative for conjunctival bacteria with topical antibiotics without surgical intervention [11].

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