CLINICAL STUDY

Low frequency of bacteraemia during eye surgery obviates the need for endocarditis prophylaxis

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Abstract

Purpose **To determine the incidence of bacteraemia following eye surgery, and thereby evaluate the need for antibiotic cover during such procedures, in patients who are at risk for bacterial endocarditis.**

Methods **This prospective study involved 50 consecutive patients undergoing extraocular surgery at the Sultan Qaboos University Hospital, Muscat, Oman. Local preparation of the surgical site in all patients included pre-operative instillation of 0.3% gentamicin and 3% povidone-iodine eye drops. Two eye swabs (one from the conjunctival sac and another from the eyelid margin) and two venous blood samples (one taken just before the procedure and the second 10 min into it) were collected and cultured for aerobic and anaerobic bacteria. Surgery-related bacteraemia was defined as a negative pre-operative blood culture followed by a positive intraoperative blood culture of the same bacterium identified in the positive eye swab.**

Results **Only two patients (4%) demonstrated surgery-related bacteraemia: one caused by *Staphylococcus epidermidis* (following entropion correction) and the other by *Haemophilus influenzae* (following dacryocystorhinostomy). Four other patients had positive conjunctival swabs without bacteraemia, the causative organisms being *Haemophilus influenzae* in two, and *Staphyloccus aureus* and *Klebsiella pneumoniae* in one each.**

Conclusion **Ophthalmic surgery is not associated with significant bacteraemia, and therefore does not mandate routine antibiotic cover in patients at risk for bacterial endocarditis. Stringent pre-operative preparation of the surgical site may suffice to minimise bacteraemia; however, this requires further study.**

Key words Bacteraemia, Endocarditis prophylaxis, Eye surgery, Local antibiotics, Local preparation

The occurrence of bacteraemia during surgical procedures is common, and such procedures are performed under cover of antibiotics in patients prone to develop infective endocarditis. There are numerous studies on the incidence of bacteraemia following procedures such as dental extraction,[1] tonsillectomy,[2] gastrointestinal endoscopy,[3] skin surgery,[4] transoesophageal echocardiography[5] and endotracheal intubation.[6] However, literature is scarce with respect to patients undergoing ocular surgery. We conducted this study to investigate the incidence of bacteraemia and thereby the necessity of endocarditis prophylaxis during eye surgery.

Patients and methods

Fifty consecutive patients undergoing extraocular operative procedures at the Sultan Qaboos University Hospital were prospectively studied. As intraocular surgeries are generally not associated with significant bleeding, patients undergoing such procedures were not included in the study. Patients on systemic antibiotics prior to surgery were also excluded. However, topical antibiotics, if used, were not discontinued.

All patients underwent a complete ophthalmic examination with emphasis on detecting signs of ocular infection in the lid, conjunctiva and lacrimal sac. In addition, cardiac evaluation was performed to look for any heart disease that could predispose to infective endocarditis. The protocol had the approval of the Medical Research and Ethics Committee, Sultan Qaboos University, Oman, and prior informed consent was obtained from each patient or patient's parent for the study.

Local antiseptic procedures applied uniformly to all the patients included (i) cleaning of eyelids with a sterile cotton swab stick soaked in saline, (ii) irrigation of the conjunctival sac with 15 ml saline, (iii) instillation of 2 drops of 0.3% gentamicin eye drops and 3% povidone-iodine drops, (iv) skin

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Table 1. *Extraocular surgeries performed on study patients* (n = *50)*

Surgical procedure	No. of patients (%)
Squint surgery	17 (34%)
Entropion correction	8 (16%)
Pterygium excision	7 (14%)
Dacryocystorhinostomy	6 (12%)
Obstructed NLD probing	2 (4%)
Conjunctival nodule excision	2 (4%)
Chalazion excision	2 (4%)
Enucleation for retinoblastoma	2 (4%)
Molluscum contagiosum excision	1 (2%)
Lid naevus excision	1 (2%)
Retinal detachment surgery	1 (2%)
Tarsorrhaphy	1 (2%)

NLD, nasolacrimal duct.

preparation with 10% povidone-iodine, and (v) drying of the site as well as application of sterile drapes.

Two eye swabs were taken just before surgery – one from the conjunctival sac and another from the eyelid margin – using standard procedures.[7] The swabs were plated on to fresh blood agar and chocolate agar plates and transported immediately to the laboratory for culture. The swab cultures were read at 18 h and again at 48 h. All isolates were stored at –80 °C in Microbank sterile vials (Pro-Lab Diagnostics, Boromborough, Wirral L62 3PW, UK) containing cryopreservative and porous beads which serve as carriers to support micro-organisms. Isolates were identified using routine diagnostic procedures. Blood was obtained employing a strict aseptic technique consisting of an iodine alcohol scrub followed by an iodine scrub. Two samples were drawn (5–10 ml for adults and 3–5 ml for children), one just before and another 10 min into the procedure. A 25-gauge butterfly needle was used to inoculate aerobic and anaerobic blood cultures, which were then incubated in Bactec 9240 at 37 °C (Becton Dickinson, Towson, MD 21204). The blood cultures were read at 48 h and again at 1 week. To ensure uniformity, all samples were collected by a single investigator (N.D.); related microbiological work was also carried out by a single investigator (A.M.R.).

Surgery-related bacteraemia was defined as a negative pre-operative blood culture followed by a positive intraoperative blood culture of the same bacterium (based on antibiotic sensitivities) identified in the positive eye swab. Patients with positive blood cultures were followed up for 4 weeks for evidence of any features of systemic infection.

Data entry and analysis was performed using the Statistical Package for Social Sciences (SPSS) 9 for Windows 2000.

Results

The patients ranged in age from 6 months to 50 years (median 10 years, mean 25 years) and included 22 males and 28 females (M:F = 1:1.3). Seventeen patients (34%) showed signs of local infection (blepharitis 6, conjunctivitis 3, dacryocystitis 8). All these patients were on local antibiotics. None of the patients had a cardiac abnormality that could predispose to endocarditis.

The extraocular surgeries that were performed are listed in Table 1, and the results of the positive swab and blood cultures in Table 2. Among the 50 conjunctival swab cultures, 6 (12%) were positive for pathogenic bacteria. Two patients (4%) with positive conjunctival swabs demonstrated surgery-related bacteraemia, one caused by *Staphylococcus epidermidis* (following entropion correction) and the other by *Haemophilus influenzae* (following dacryocystorhinostomy). Repeat blood cultures on these positive patients did not yield any bacterial growth, confirming the transient nature of the bacteraemia. None of the patients showed any clinical evidence of systemic infection.

Discussion

Consensus-based national guidelines for prevention of infective endocarditis have been published by the American Heart Association,[8] the British Society for Antimicrobial Chemotherapy,[9] the Group of Experts of the International Society for Chemotherapy[10] and the Netherlands Heart Foundation.[11] However, none of these guidelines have discussed the risk of eye surgery in the development of endocarditis in susceptible patients.[12] A MEDLINE search revealed one study on 40 children undergoing surgery for nasolacrimal duct obstruction, which showed a significant incidence (17.5%) of lacrimal-probe-induced bacteraemia.[13] The authors recommended antibiotic prophylaxis during nasolacrimal duct probing in patients at risk for endocarditis.

The present study has evaluated 50 patients who underwent various extraocular surgeries. Whilst 34% of the patients showed clinical signs of ocular infection, positive conjunctival swab growth was obtained in only 12% of patients. However, the results of bacterial cultures

Table 2. *Details of patients with positive cultures*

Patient no.	Surgical procedure	Specimen	Organism isolated
3	Entropion correction	Conjunctival swab	*Staphyloccus epidermidis*
		Post-operative blood	*Staphyloccus epidermidis*
17	Nasolacrimal duct probing	Conjunctival swab	*Haemophilus influenzae*
20	Dacryocystorhinostomy	Conjunctival swab	*Haemophilus influenzae*
		Post-operative blood	*Haemophilus influenzae*
32	Dacryocystorhinostomy	Conjunctival swab	*Haemophilus influenzae*
40	Entropion correction	Conjunctival swab	*Staphyloccus aureus*
45	Dacryocystorhinostomy	Conjunctival swab	*Klebsiella pneumoniae*

need not necessarily correlate with clinical infections. Of these 12% of patients, only 4% had surgery-related bacteraemia with the same organism recovered from the eye. Among the bacteria recovered from our patients, *Staphylococcus epidermidis* does cause endocarditis but usually in intravenous drug abusers or patients with indwelling central venous devices.[14] The other organisms were not the common ones associated with infective endocarditis.[15]

It is worth noting that strict aseptic measures were adopted in preparing the operative site in all patients. Povidone-iodine reduces conjunctival bacterial flora by 91% when applied to the eye just before surgery,[16] and a definite synergistic effect is observed when applied in conjunction with a topical antibiotic.[17] In the report on lacrimal-probe-induced bacteraemia[13] local antiseptic measures prior to probing were not elaborated, and topical antibiotics had been discontinued 1 week prior to the procedure. We postulate that in our study the stringent measures adopted in preparing the surgical site pre-operatively contributed to the reduced incidence of bacteraemia.

In conclusion, the low frequency of bacteraemia seen in our study does not support a role for endocarditis prophylaxis with antibiotics in patients with 'at-risk' heart diseases undergoing eye surgery. Local antiseptic measures are effective in minimising bacteraemia. Although the number of patients with positive blood cultures in our study was small, further investigation involving larger number of infected cases is warranted. This will facilitate a more accurate assessment of the incidence, severity and duration of bacteraemia following eye surgery, and help to evolve recommendations on local therapeutic interventions prior to eye surgery.

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