Evaluation of the Results of the Culture of Fornix and Surgical Needle during Strabismus Surgery

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Abstract

***Purpose*:** To assess the rate of microbial contamination of the fornix and suture needle during strabismus surgery

***Methods*:** In a prospective study in Khatam-al-Anbia Eye Hospital, fornix samples and suture needles were cultured in 28 eyes of 28 patients. Fornix sampling was performed before and after preparation of the eyes and the needles and remained string were transferred to culture media directly at the end of operation. All samples were cultured in aerobic and anaerobic media. Findings were analyzed statistically.

***Results*:** Twenty-four cases (85.7%) of pre-preparation samples were positive for staphylococcus (coagulase positive and negative, 67.85%), peptostreptococcus (3.57%) and gram positive bacillus (14.28%). After preparation, 16 cases (57.1%) of infected samples changed to sterile (P=0.002). Only 15 cases (53.57%) of needles culture were sterile. There was no evidence of cellulitis or significant conjunctivitis postoperatively in patients.

***Conclusion*:** Because of close relationship between the organisms cultured from pre-preparation fornix's samples and needles culture, we concluded that the most probable source of contamination is the normal flora of the fornices. Also because of high possibility of needle contamination (46.43%) during strabismus surgery, care must be taken to avoid globe penetration and if it happened, prophylaxis for endophthalmitis seems to be reasonable.

***Keywords*:** Strabismus Surgery, Endophthalmitis, Bacterial Culture, Scleral Penetration

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Introduction

There are few reports of endophthalmitis following strabismus surgery. The estimated incidence ranges from 1:3500 to 1:185000.[1] Despite its major impact on visual outcome, the relative rarity of the complication has made it difficult to evaluate definitively. Both the source of the bacteria and the mode of transmission are unknown. Previous reports have speculated on exogenous or endogenous sources, including normal or transient ocular flora.[2-3] Numerous studies have evaluated methods to decrease preoperative conjunctival bacterial counts in hope of decreasing the risk of infection after strabismus surgery.[4-6] Conventionally most pediatric ophthalmologists use 5% povidone-iodine immediately before surgery, but none of the methods sterilize the conjunctiva completely.[7] Even if the host conjunctiva is a major source of infection, the mode of entry to the intraocular space remains unknown. Parks[2] believes that a postoperative cellulitis or abscess is the cause of endophthalmitis. Others suggest that scleral perforation by needles provides a method of access for bacteria.[2-3]

If scleral perforation is involved in the mechanism of endophthalmitis, then needle sterility is an important issue. If needles became contaminated from any sources, including conjunctival flora, they could deposit bacteria intrasclerally, in the suprachoroidal spaces, or in the vitreous cavity. This study hopes to determine the sterility of needles that are used during strabismus surgery.

Methods

The study was performed in prospective design. Twenty-eight patients undergoing strabismus surgery by the first author were eligible for enrollment. In the operating room, after sampling for aerobic and anaerobic cultures from lid margin and conjunctival fornix with sterile cotton tipped applicator, the patients lids were soaked with 10% povidone-iodine (Betadine^{R}) solution. Also some drops of 5% povidone-iodine (Betadine^{R}) solution instilled into the inferior fornix. After 5 minutes, lids and fornices were irrigated by sterile normal saline. No patient received preoperative prophylactic antibiotics. Sampling was repeated immediately before operation. Both swabs were labeled as "A" or "B" for the pre-preparation and post-preparation swabs respectively. The patient's details were kept separately with the same letters. The swabs transferred directly to the culture media for aerobic (blood agar) and anaerobic (thioglycolate agar) culture. By this method and to reduce bias, the microbiologist was blinded to the pre and post-preparation samples. At the end of the surgery, the suture needles were gathered and transferred to culture media directly (one in aerobic and one in anaerobic media). Any bacterial growth from either the aerobic or anaerobic media was considered positive. The results were analyzed by appropriate statistical tests.

Results

Samples of 28 cases (10 males and 18 females) were studied. Twenty-four cases (85.7%) of pre-preparation samples were infected by staphylococcus (coagulase positive and negative, 67.85%), peptostreptococcus (3.57%) and gram positive bacillus (14.28%). In 4 cases (14.28%) no organism was cultured (Tables 1 and 2). After preparation, 16 cases (57.1%) of infected samples changed to sterile (11 cases (39.3%) were infected, 1 sample was missed) (P=0.002 (Mc Nemar test)) (Tables 3 and 4). Eighteen cases (64.28%) of needle samples were sterile and 10 cases (35.72%) were infected (Tables 5 and 6). Except for one case (number 12) the source of infection seems to be the same as pre-preparation infective organisms. The infective organism in all cases was coagulase negative streptococci. There was no evidence of cellulitis or significant conjunctivitis postoperatively in patients.

Table 1. Preprep aerobic culture

		Frequency	Percent
Valid	Sterile	6	21.4
	Coagulase neg. staphylococcus	18	64.3
	Gram pos. Bacillus	4	14.3
	Total	28	100.0

Table 2. Preprep anaerobic culture

		Frequency	Percent
Valid	Sterile	10	35.7
	Coagulase neg. staphylococcus	13	46.4
	Peptostreptococci	1	3.6
	Gram pos. Bacillus	3	10.7
	Total	27	96.4
Missing		1	3.6
Total		28	100.0

Table 3. Postprep aerobic culture

		Frequency	Percent
Valid	Sterile	16	57.1
	Coagulase neg. staphylococcus	8	28.6
	Klebsiella	1	3.6
	Pneumococcus & S.T.N.	1	3.6
	Gram pos. Bacillus	1	3.6
	Total	27	96.4
Missing		1	3.6
Total		28	100.0

Table 4. Postprep anaerobic culture

		Frequency	Percent
Valid	Sterile	18	64.3
	Coagulase neg. staphylococcus	7	25.0
	Peptostreptococci	1	3.6
	Gram pos. Bacillus	1	3.6
	Total	27	96.4
Missing		1	3.6
Total		28	100.0

Table 5. Postop aerobic culture of needle

		Frequency	Percent
Valid	Sterile	19	67.9
	Coagulase neg. staphylococcus	9	32.1
	Total	28	100.0

Table 6. Postop anaerobic culture of needle

		Frequency	Percent
Valid	Sterile	23	82.1
	Coagulase neg. staphylococcus	5	17.9
	Total	28	100.0

Discussion

Postoperative infection after strabismus surgery is a rare but potentially devastating event.[2] Estimates in the literature vary widely. Retrospective reviews have documented an incidence of between 1 in 3,500 to 1 in 185,000[1] cases. Ing documented an incidence of only 1 per 30,000 cases.[8] Because of this low incidence, the cause and prevention method of postoperative endophthalmitis are speculative.

Ing found no correlation between infection rate and the use of prophylactic antibiotics.[8] Most studies of the prevention method of postoperative infection have concentrated on reducing the population of the patient's own bacterial flora.[4-6] This hypothesis assumes that patient's own bacterial flora, either normal low virulent types or transient higher virulent types, are the source of postoperative infection. With use of molecular epidemiology, studies have demonstrated that the pathogens responsible for endophthalmitis after cataract surgery are identical to those residing on the patients own external tissue.[9,10] Furthermore, 43% of patients undergoing uncomplicated cataract surgery demonstrate culture-positive anterior chamber aspirate.[11] These studies strongly suggest that bacterial from external ocular structures are often introduced into the eye during cataract surgery and, if the bacterial load is large enough or virulence great enough, infection may occur. We postulate that the patient's own bacterial flora is somehow introduced into the eye during muscle surgery and may be responsible for development of an intraocular infection (Tables 1, 2, 5 and 6).

Globe perforation during strabismus surgery is not uncommon. It has been estimated to occur in between 1% and 12% of cases.[12] Most perforations are not detected during surgery. If the needle was not sterile, the exogenous bacteria could be inoculated into the eye through the perforated site after surgery or at the time of the surgery. The results of our study show that these needles are not always sterile and in 40% of our cases, the needles were found to be contaminated. As the results indicate, bacterial growth in these needle cultures closely resembles culture results of normal conjunctival flora. Therefore it is logical to speculate that the needles used during

strabismus surgery may be a route of introducing resident bacteria into the eye. However the introduction of bacteria into the suprachoroidal or deeper spaces of the eye does not necessarily equal to clinical infection. If scleral perforation was assumed in at least 1% of the strabismus surgery and the needles contamination rate by conjunctival flora was speculated for 40%, then bacteria could be introduced at a rate of 4 per 1000 cases of operations. This number, although low, but is considerably higher than the rate of endophthalmitis. It is however close to the rate of overall periocular infection.[13]

Conclusion

Because of high possibility of needle contamination by lid margin or fornix flora during strabismus surgery, care must be taken to avoid globe penetration and if it happened, endophthalmitis prophylaxis seems to be reasonable. Also irrigation of fornices by povidone-iodine along with skin preparation is advised.

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