Original Article

Assessment And Comparison of Bacterial Contamination in Anterior Chamber Aspirates in Small Incision Cataract Surgery (SICS) And Phaco-Emulsification

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Abstract

Introduction: The rate of occurrence of endophthalmitis after cataract surgery has been reduced to a greater extent now a day. Even then endophthalmitis related consequences are devastating. Several sources of infection, including contamination by air, solutions, surgical instruments, intraocular lens, and wound leakage have been identified. **Aim of the study:** The study aimed to evaluate the influence of two methods of surgical technique of cataract surgery in bacterial as well as comparison of contamination by these two techniques. **Methods:** This prospective observational study was conducted over 60 patients with age related cataract in the department of Ophthalmology and Microbiology in Sir Salimullah Medical College and Mitford Hospital, Dhaka, Bangladesh, from 1st January, 2009 to 30th June, 2009. Patients were selected purposively based on specific selection criteria. Selected patients underwent detail ophthalmic and systemic evaluation as well as relevant investigations. Cataract extraction followed by intraocular lens implantation was planned for all patients. The two techniques of cataract surgery such as SICS and Phacoemulsification were assigned to the patients randomly by 1:1 basis. 1 ml of anterior chamber contents were aspirated through aseptic technique by 26G needle from each patient pre-operatively, after capsulorrhexis (early per-operative) and just before wound closure by stromal hydration (late per-operative). All samples were sent for 10% KOH staining and culture and sensitivity test after proper leveling. **Results:** Micro-biological examination shows no sample was positive for 10% KOH staining. In SICS group, out of 30 samples 3 were found culture positive, which were positive in 4 and 5 samples in early per-operative and late per-operative sample respectively and in Phacoemulsification group, it was 2, 3, 5 pre-operative, early per-operative and late per-operative sample respectively. The common organisms isolated were Coagulase positive Streptococcus, Corynebacterium species, Streptococcus viridans, and Staphylococcus aureus etc. Almost none of the patients showed clinical activity except few cells and flare in the anterior chamber in early post-operative period. **Conclusion:** The microbiological examination shows the incidence of microbial contamination of anterior chamber contents is very low after cataract surgery by both form of technique, and there was no statistically significance difference in incidence between these two techniques.

Keywords: Microbial contamination, Small Incision Cataract Surgery (SICS) And Phaco-Emulsification.

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Introduction

Endophthalmitis after cataract surgery in all forms is a dreaded complication which often leads to permanent loss even after optimum treatment. The morbidity associated with the incidence of postoperative endophthalmitis has generally been decreasing over the last few years, its associated complications continue to be devastating.[1-3] Several studies have identified different sources of infections, including trauma, eyelid margin, airborne contamination, solutions, surgical instruments, intraocular lenses, and wound leaks.[1-5] Nevertheless, in most cases, the ultimate source of the infection could not be identified, and the indigenous flora harbored in the eyelids and ocular annexes have been proposed to be responsible for the onset of

bacterial endophthalmitis.[5-7] Studies done in this issue shows that bacterial contamination of the anterior chamber during cataract surgery occurs in 20% 40% of cases.[6,8-11] There is no established relationship between the presence of bacterial microorganisms and subsequent development of endophthalmitis, one study findings suggests that there is a relationship between the indigenous flora and the infecting organism in patients with endophthalmitis.[12] The most of the postoperative intraocular infections are caused by an organism that is introduced at the time of the surgery. The major source of intraocular contamination is the conjunctival flora. Organisms enter the anterior chamber (AC) either directly[13] or indirectly by intraocular lenses.[14] The role of such contamination in the production of postoperative inflammation and infection is well recognised.[15,16] It would therefore seem prudent to minimize bacterial entry into the AC during cataract surgery to reduce the risk of postoperative endophthalmitis. Careful preoperative preparation can greatly influence the rate of potential microbial contaminants. Attention to surgical technique can further reduce the intraocular delivery of micro-organisms. For example, an AC maintained at higher than atmospheric pressure might have a lower rate of bacterial contamination. This is thought theoretically that the number of micro-organisms entering the AC preoperatively might be reduced in phacoemulsification surgery, because of the constant infusion of fluid at greater than atmospheric pressure and the smaller incision. The aim of this study was to assess the effect of two different techniques of cataract extraction small incision cataract surgery (SICS) and phacoemulsification (phaco), on the rate of AC microbial contamination. The study findings may help to the practicing cataract surgeon to take decision about the modality of surgery as well as take extra-measures during surgery and choice of antibiotics after surgery to prevent per-operative bacterial contamination of anterior chamber contents and postoperative endophthalmitis after cataract surgery.

Methods

This prospective observational study was conducted at the Department of Ophthalmology, Sir Salimullah Medical College and Mitford Hospital, the study period spanned from January 1, 2009, to June 30, 2009. The study aimed to investigate patients with age-related cataracts who were attending the department for cataract surgery. The study population consisted of all patients meeting the inclusion criteria for age-related cataracts. Patients suffering from other intra-ocular or ocular surface disease, having history of ocular surgery or trauma in the previous six months, suffering from active systemic infection and taking steroid or other immunosuppressive drugs were excluded from the study. Finally, the study included 60 patients, with 30 patients assigned to undergo small incision cataract surgery (group-A) and 30 patients assigned to undergo Phacoemulsification (group B). Non-random purposive sampling was employed to select the participants. Data collection involved enrolling patients based on specific selection criteria and conducting detailed ophthalmic and systemic clinical evaluations and relevant investigations. Cataract surgery was performed on all patients, and they were categorized into group-A or group B based on the assigned surgical procedure. Intraocular lens implantation was carried out for all patients. Prior to surgery, after capsulorhexis, and after wound closure, anterior chamber contents were collected using a 26 G needle and a 3cc syringe. These samples were then subjected to 10% KOH staining, gram staining, and culture in the microbiological laboratory. The findings were recorded on a pre-designed data collection sheet. Data analysis was conducted using the SPSS software version 20 for Windows. Here, chi square test and Fisher Exact test was used to find out association of categorical variables. For all analyses, level of significance were set at 0.05 and p-value <0.05 was considered as significant.

Results

Table 1: Age distribution of the study subjects(N=60)

Age group (in years)	Group A	Group B	p value
40-45	2 (6.7%)	2 (6.7%)	
45-50	6 (20.0%)	5 (16.7%)	
50-55	7 (23.3%)	8 (26.7%)	0.999*
55-60	8 (26.7%)	9 (30.0%)	
60-65	7 (23.3%)	6 (20.0%)	

*Fisher Exact test

There was no significant difference in the distribution of age between the two groups (p=0.999) (table 1).

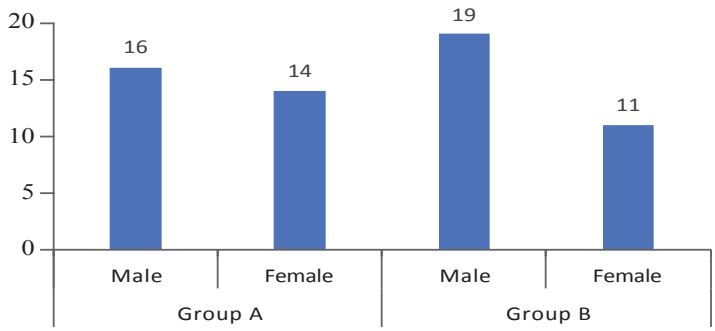

Figure 1: Bar diagram showing the gender distribution of the study subjects(N=60)

In both groups, proportion of male patients were higher (group A: 53.3%; group B: 63.3%) than female (figure 1)

Table 2: Distribution of grading of cataracts of the study subjects (N=60)

Cataract grade	Group A	Group B	p value
Grade 1	2 (6.7%)	3 (10.0%)	
Grade 2	16 (53.3%)	14 (46.7%)	0.864*
Grade 3	12 (40.0%)	13 (43.3%)	

*Fisher Exact test

The results showed that Grade-2 cataracts were the most common in both groups, with 16 patients (53.33%) in Group A and 14 patients (46.67%) in Group B. There was no significant difference in the distribution of cataract grades between the two groups (p=0.864).

Table 3: Distribution of culture-positive patients at different time point (N=60)

Time point	Group A	Group B	p value
Pre-operative	7 (23.3%)	6 (20.0%)	0.754*
Early post-operative	6 (20.0%)	4 (13.3%)	0.488*
Late post-operative	4 (13.3%)	3 (10.0%)	0.999**

*=Chi-square test, **=Fisher Exact test

There were no significant differences in the distribution of culture-positive patients between the two groups at any time point (p>0.05).

Table 4: Common organisms isolated during different times of surgery (N=60)

Organism	Pre-operative	Post-operative
Coagulase-negative Staphylococci	5 (8.3%)	7 (11.7%)
Corynebacterium species	4 (6.7%)	5 (8.3%)
Streptococcus viridans	3 (5.0%)	3 (5.0%)
Streptococcus aureus	1 (1.7%)	1 (1.7%)

Coagulase-negative Staphylococci were the most frequently isolated organisms, with 5 occurrences in the pre-operative samples and 7 occurrences in the post-operative samples. Corynebacterium species were found in 4 pre-operative samples and 5 postoperative samples. Streptococcus viridans and Streptococcus aureus were less commonly isolated, with 3 occurrences each in both the pre-operative and post-operative samples (table 4).

Discussion

In spite of technical improvement in the field of intraocular surgery and all the precautions taken, endophthalmitis is still a major postoperative complication. The reported incidence following ECCE is about 0. 1%,[5] ranging between 0.05% and 0.3%,[6]. However, the true figure is likely to be higher than this, with many milder cases being both unrecognized and unreported and considered sterile postoperative inflammation. The normal flora of the ocular surface and conjunctiva, especially CNS, is well known to produce postoperative inflammation and infections.[13,15] and is thought to be the main source of contamination. Irrigation of the conjunctiva before and during surgery introduces more micro-organisms from the conjunctiva crypts onto the surface.[17] Airborne microbes can also be entered into the AC by through intraocular lenses.[14] It is established that preoperative use of povidone-iodine reduces the microbial contamination of the operating field significantly[18,19] and was used in this study. Preoperative antibiotics were not used since they have only a limited effect on reducing ocular surface bacteria.[20] Surgical techniques can alter the delivery rate of microbes into the AC and vitreous cavity. The incidence of endophthalmitis is higher following intracapsular cataract extraction[21] when compared with ECCE. It is also higher in the event of a capsular rupture.[22] Anterior chamber collapse and shallowing during the aspiration phase of ECCE can introduce microbes into the AC owing to a pressure lower than the atmosphere.[13] This has been the basis for speculation that phaco with the use of a small incision and better preservation of the AC throughout the surgery can reduce the rate of contamination. Egger et al in two identical studies of 200 patients undergoing cataract extractions have shown less intraocular contamination with phaco.[23]

Limitations of the study

The study was conducted in a single center with a small sample size which may not represent the whole community

Conclusion

The analytic result of the current study shows that the incidence of microbial contamination of the anterior chamber during manual sics and phacoemulsification of cataract surgery are very low and similar in both techniques.

Recommendation

To reduce the incidence of endophthalmitis in intraocular surgery, it is recommended to strictly adhere to aseptic techniques, use povidone-iodine for preoperative preparation, consider phacoemulsification instead of ECCE, prevent anterior chamber collapse during ECCE, continuously monitor and report endophthalmitis cases, and regularly update practices based on emerging research.

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