

# The Necessary Steps for Endophthalmitis Prophylaxis

A description of the precautions that the Aravind Eye Hospital has found necessary and unnecessary.

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**C**ataract extraction is the most commonly performed ophthalmic surgical procedure worldwide. Postsurgical infection is a major complication, but certain measures can minimize the problem. Unfortunately, these steps are both expensive and time consuming.

Aravind Eye Hospitals are a network of five centers located at various sites throughout Tamil Nadu, South India. On average, physicians in the network perform more than 800 intraocular surgeries each working day. To facilitate this volume, we developed a system of sterilization and asepsis for intraocular procedures. The protocols are cost effective and address all potential sources of infection. We have stringently monitored the protocols and proven them to be efficient and effective at minimizing postoperative infection. This article describes these procedures, some of which are unique to our patient population.

## **PREOPERATIVE PROPHYLAXIS**

Our preoperative prophylaxis consists of ensuring the patency of the patient's nasolacrimal duct and applying conjunctival antibiotics. We use topical ciprofloxacin or ofloxacin according to the sensitivity pattern we have observed in our hospital isolates. We apply drops once every 2 hours on the day prior to surgery. We do not use systemic antibiotics. We also perform a preoperative conjunctival culture if the patient has functional vision in only one eye, has a partial or complete blockage of his



**Figure 1.** The patient's eyelashes and the operating area are well covered by a cost-effective eye drape.

lacrimal passage, or has received treatment for an infected eyelid. Because chronic dacryocystitis is common, we routinely inject fluid through a syringe into the lacrimal passage in order to rule out an obstruction and associated infection. If necessary, we perform a dacryocystectomy before cataract surgery. We also make sure to exclude infection of the lid margin or conjunctival sac.

## **INTRAOPERATIVE PROTOCOLS**

On the day of surgery, patients continue to receive antibiotics. They walk into the OR in their own clean



Figure 2. An assisting nurse prepares the instrument trolley.

clothes. In the preoperative holding area, we clean the periocular skin with 10% povidone-iodine solution. When patients are on the operating table, we apply a 5% solution of povidone-iodine to the conjunctival sac. Eyes undergoing phacoemulsification receive a disposable plastic drape to catch excess irrigating fluid. In other cataract surgeries, we use a reusable, sterile cotton drape and a small plastic drape to cover just the surgical field (Figure 1). They keep the lashes and lid margins (common sources of infection) away from the surgical site.

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Our surgeons and OR staff scrub, without brushes, for 6 to 8 minutes using chlorhexidine solution. Surgeons dress in sterile cotton gowns at the beginning of a surgical session, and they change only if they take a break or leave the sterile area. Typically, a surgeon continues to operate for 4 to 5 hours per session.

We typically do not put on fresh gloves for every case. Instead, in between operations, surgeons and the nursing staff apply chlorhexidine rub antiseptic solution to their gloves. This sterilization is sufficient, because there is no contact with blood, surgery takes place on a sterile ocular surface, and the OR staff does not touch the tips of instruments that come into contact with ocular tissue. In comparing our procedure with the practice of regularly changing surgical gloves,



Figure 3. The surgeon operates on two tables, between which is located the operating microscope.

we have found no difference in contamination rates and therefore conclude that the antiseptic scrubbing of gloves is an acceptable practice for use in cataract surgery.<sup>1</sup> We change gloves only if there is contact with a nonsterile surface or if the surgeon operates for more than 3 hours.

Our surgical instruments are packed in stainless steel bins and placed on custom-made trays. We sterilize instruments the previous night using a gravity-based steam sterilizer. The OR is cleaned the day before according to a standard protocol.

Our surgical trolleys are lined with sterile cotton towels that, in turn, are covered with sterile plastic sheets to prevent the transfer of lint and to avoid the soaking of the cotton (Figure 2). Sterilized instrument trays are removed from the bins and placed onto the trolleys. The staff then places instruments on the operating table on a folded plastic sheet to ensure that their tips do not touch the trolley’s surface. After the surgeon returns an instrument, it is placed on the original tray that is kept on the trolley. At the conclusion of a surgery, the trays are returned to a running nurse who cleans the instruments with a brush and deionized water. The nurse then sterilizes the instruments at 134°C and 30 lbs of pressure using a high-speed autoclave. These units can hold two surgical bins, each containing eight surgical sets. Because the autoclave cycle length is approximately 10 to 12 minutes, we can effectively turn around 64 surgical sets in 1 hour and maintain continuous surgery.

Each surgeon is provided with four instrument sets per table and, typically, will have two tables on which to operate (Figure 3). In order to maximize operative productivity, as one patient receives treatment, the next is cleaned and prepared on the other table by a circulating

nurse. At the same time, the second assisting nurse will prepare the trolley for the next surgery by taking the instruments from a fresh sterile tray.

We do not sterilize the ultrasonic handpiece in between phaco cases, but we do resterilize the phaco needles, sleeves, and I/A handpieces. We also share between cases the Ringer's lactate solution that we use to irrigate the anterior chamber.

## CONCLUSION OF SURGERY AND CLEANING

At the end of surgery, we clean the eye and administer a drop of antibiotic solution or povidone-iodine before placing a sterile cotton pad and a bandage. Typically, we do not use a subconjunctival or systemic antibiotic.

At the end of the day, water containing benzalkonium solution is used to clean the floors and the surgical tables, and solutions such as isopropyl alcohol are used to clean surgical microscopes and phaco machines. The rooms are not cleaned in between cases. During the break separating the morning and afternoon sessions, the OR is cleaned and mopped to remove the dirt produced by the constant turnover of staff and patients.

## CAUSES AND INCIDENCES OF ENDOPTHALMITIS

One potentially infectious cause of endophthalmitis in India is the Ringer's lactate solution used to irrigate the anterior chamber. Surgeons across the country use various brands of Ringer's lactate. At Aravind, the glass bottles in which the solution is supplied are autoclaved 1 day prior to surgery and are routinely checked for any suspended particulates immediately before they are used. This precaution is essential, because, within India, the production of these fluids is not stringently regulated.

In 2006, our hospital's physicians performed 36,386 phaco procedures, and the incidence of endophthalmitis in this group was 0.06%. We also performed 141,394 manual sutureless and extracapsular cataract extractions with an incidence of 0.09%. A study from our center that measured the incidence of postcataract endophthalmitis found a rate of 0.05%.<sup>2</sup> Many of our patients are from rural areas where poor personal hygiene, partially or completely obstructed lacrimal sacs, and possibly uncontrolled diabetes are prevalent. In addition, more than 120 practicing ophthalmologists from India and other countries receive short-term training in cataract surgery every year, and more than 110 residents are in training at our institutions at any given time and are responsible for performing a large number of these procedures.

It has been our experience that obstructed lacrimal passages and preexisting conjunctival microbial organ-

isms are the most common causes of postsurgical infection. Thus, we follow protocols necessary to sterilize the conjunctival sac. We also adhere to procedures that ensure that clean and sterile surgical instrument sets are provided for each case. Based on the literature and the evidence generated at our hospitals, however, we feel that changing surgical gloves or gowns between each case may be an unnecessary precaution. The detailed sterilization protocols we follow for the instruments and the preoperative management of patients are available at <http://www.v2020eresource.org>. ■

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