



## A Clinical Study of New Ways to Deliver Post-Cataract Pharmacology and Its Effectiveness

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### ABSTRACT

Patients' satisfaction with the cataract surgery service has been evaluated in this paper in order to identify areas for improvement, as well as to determine patient satisfaction with the referral, out-patient consultation, pre-assessment clinic, surgery, and post-operative care. Patients' comments on service improvement have also been reported. Patients' happiness levels were considerably affected by a variety of elements in the eye out patient department; in general, the more information offered to patients, the higher their levels of satisfaction were. When it comes to boosting the patient's pleasure with cataract surgery, meeting with the doctor, presenting all essential information, and providing written information are all critical elements.

**Method:** post-operative cataract surgery study of different parameters evaluated by the patient through physical intervention and medical parameters evaluated.

**Result:** By the survey of more than 400 patient of cataract surgery comes to the hospital, pre-operative and post-operative parameters evaluated. In pre-operative, parameters evaluated as social habits of patient, sex determination, types of anesthesia suitable for patient, etc. In post-operative, we have evaluated the effect of anesthesia and the level of particular type of anesthesia and recovery time. After the surgery, evaluated the effect of different types of antibiotics used for the recovery and prevention of eye.

**Conclusion:** By the above study conducted, the ability to comprehend both the domains of patient satisfaction as well as their relative value to patients is essential for improving the overall quality of patient care.

**Key words:** cataract surgery, retrospective study, patients.

### Introduction

#### 1.1 Background of the Research

Cataract doctors agree that postoperative eye drops are not optimal for a variety of reasons, including low compliance, low absorption, potential toxicity, and cost. As a result, various surgeons are studying novel methods of administering postoperative drugs. Some

choose to use fewer drops, while others opt to avoid topical treatments on the inside and out in favor of injectable medications. "In terms of infection prophylaxis, there is no evidence that topical operators are effective," says Samuel Masket, MD, a private practitioner at Advanced Vision Care Los Angeles and an ophthalmology clinical instructor at UCLA's Jules Stein Eye

Institute. "Additionally, patients frequently administer drops improperly [1].

Additionally, compliance deteriorates when prescriptions are required to be taken as frequently as four times per day. Similarly, some patients are sensitive to preservatives, particularly if they have been on medication for an extended period of time. A few people develop punctate keratopathy, which has a detrimental effect on comfort and vision. Another ongoing annoyance occurs at the pharmacy when the pharmacist substitutes marked prescriptions for generic eye drops or when the patient's insurance does not cover a certain medication. This in and of itself is a source of concern for us and a reason to discontinue using eye drops."

### **Injection**

Additionally, an increasing body of evidence indicates that antibiotics administered intraocularly are safe and effective for infection prophylaxis. Dr. Masket co-authored a 2008 study that concluded there was no increased risk associated with intracameral injection of moxifloxacin contrasting and adjusted salt solution [2].

Currently, an open-label study is being conducted in which 57 eyes of 47 patients were treated with intracameral moxifloxacin or an equal dose of adjusted salt solution following cataract surgery. Preoperatively and for a quarter of a year postoperatively, visual acuity, intraocular pressure, endothelial cell counts, corneal pachymetry, corneal clarity and edoema, and anterior chamber cells and flare were examined. Optical coherence tomography results demonstrated no factually significant differences between the two treatment groups at both time focuses.

At the moment, for surgeons who wish to go "dropless" but do not wish to compound their own injections, Imprimis markets TriMoxi, a combination of moxifloxacin and triamcinolone, and TriMoxiVanc, a combination of moxifloxacin and vancomycin "It is proposed to inject the mixture into the vitreous through a transzonular cannula. The disadvantages include decreased vision during the early postoperative period due to the

triamcinolone suspension, probable zonule injury, and the absence of an NSAID."

### **"Fewer Drops"**

Few specialists, on the other hand, are hesitant to provide entire drops. "Dropless injectable antibiotic/steroid combos are a sound idea with favourable outcomes, and they may be particularly beneficial in non-compliant, physically challenged, and/or impoverished patient populations. Although the education curve is brief, the surgeon must be comfortable injecting a sufficient quantity into the vitreous cavity using a trans-zonular technique or pars plana injections [3]. Floaters: Immediately following refractive cataract surgery, "The "amazing" element has become increasingly important to patients and as a training manufacturer as a result of word of mouth and social media, and the prednisolone stranding is an issue for many patients.

Preoperative counseling, expectation management, and patient determination all help, but when patients are still battling in the first week and their drop-using friends exalt their superior immediate vision, patients occasionally neglect this preoperative session. Edema: "Indeed, even with perfect delivery, an infrequent patient will require additional steroid/NSAID drops, which can be addressed preoperatively once again. Regardless, the reality of costly drops in addition to the injection (which they paid for) may irritate some patients, and they will wonder why they chose the drop less treatment when they eventually require and pay for 'extra' drops. Once again, this is a time waste for staff workers and renders these patients unenthusiastic ambassadors for the drop less system. "Once the steroid is administered, it cannot be discontinued, creating patient safety and medicolegal concerns, especially if the patient lives a long distance from the practice and has trouble accessing even a comanaging optometrist/ophthalmologist. If the patient is a steroid responder, numerous additional visits, medications, expenditure, and discomfort to the patient's family will be required to maintain IOP control.

### **1.2 Pharmacoepidemiology of Drugs Used In Patients Receiving Post-Cataract Surgery**

In India, cataract is the leading cause of blindness, accounting for 62.6 percent of blindness, according to a national programme for blindness control survey, and to our knowledge, there are not many methodically broken down data on drug usage research for post-cataract surgery medical intervention in India. Thus, the current study was done to collect baseline data on drug usage and to dissect the many components of drug advising practices [4].

Pharmaco-theory of disease transmission is the application of epidemiological information, methodologies, measurements, analysis, and reasoning to consider the potential uses, economic viability, and adverse effects of pharmaceuticals in a defined population. Cataracts account for 33% of blindness worldwide. According to the NPCB, cataract is the leading cause of blindness in India, accounting for 62.6 percent of cases. The WHO has identified cataracts as one of five important blinding eye disorders that require immediate attention in order to achieve Vision 2020's objectives. Cataract surgery is routinely performed to avoid blindness. Vision 2020 aims to eliminate blindness caused by cataracts by performing cataract extraction in conjunction with IOL implantation and increasing the rate of cataract surgery.

Cataract surgery is one of the most frequently done elective procedures around the country. With the advent of microsurgery, the meticulous methods have significantly improved. Additionally, the quality of treatment has improved significantly. Entanglements have decreased in the subsequent years, enhancing patients' and surgeons' hopes of a successful visual outcome [5]. As with other forms eye surgery, cataract surgery can result in uncontrolled infection and exacerbation, resulting in actual reactions such as hyphaema, iris prolapse, anterior uveitis, bacterial endophthalmitis, and auxiliary glaucoma. This research focuses on the prevention and management of infection and irritation, which is a critical component of modern cataract surgery.

As surgery has become less intrusive, recovery has been easier, and patients rarely require in-patient hospital care following the operation.

Modern minimally invasive cataract surgery with phacoemulsification is regarded as a minor procedure with a relatively painless recovery period.

However, little attention has been paid to agony and other postoperative visual aggravation symptoms, and the data on their prevalence are inconsistent. According to specific investigations, very few patients have expressed any post-operative concerns. Though various studies have revealed that the majority, if not all, of patients endure some form of postoperative visual disturbance symptoms and agony [6]. As a result, this evaluation was conducted to conduct a preliminary investigation of medications used in post-employable cataract surgery patients.

### **1.3 What Is The Current State Of Cataract Surgery?**

The method is becoming astonishingly better as imaging, estimation, and lenses improve. New delivery frameworks for anti-infection and sedative medications provide an assurance for cataract surgery. A cataract that obscures the focal point inside the eye is a common cause of poor vision and blindness in older adults. Cataracts, however, can be removed and replaced with artificial lenses. Does that sound frightening? It most emphatically is not." Cataract surgery is something that nearly everyone will require if they live long enough. Fortunately, with the array of apparatuses and innovations available to us, a good deal of it has become truly normal. By far the majority of folks achieve excellent results with their cataract and refractive surgeons at Harvard-affiliated Massachusetts Eye & Ear Infirmary.

#### **Typical surgical procedure**

Cataract surgery is performed on an outpatient basis. To remove the cataract, the surgeon makes a circular incision around the eye's focus point and then separates and removes the hazy focal point using ultrasonic technology. After that, a new focal point is inserted into the eye. A few surgeons make the incision with a surgical blade. However, surgeons are increasingly utilising an ultra-short-pulse (femtosecond) laser.

"It enables us to make incisions that are significantly more precise than those made by hand and to relax the cataract for easier evacuation. Another desired position is that the laser assists in ensuring that the implanted focus point is properly centred. Additionally, the laser incorporates 3D imaging, which improves precision.

### Recent trends

Intra-operative wavefront aberrometry is another advanced piece of technology that is even more recent. After the cataract is removed, a device connected to a magnifying lens measures the eye's overall refractive error." This enables us to more precisely ensure we are incorporating the appropriate focal point power for the eye and increases our chances of hitting our aim. This has been particularly beneficial. Additionally, the laser and intra-operative wavefront aberrometry enhanced precision by eliminating astigmatism (a blemish looking like a cornea or focal point that makes images seem contorted or hazy). Minor astigmatism can be corrected during a cataract treatment by carefully placing incisions in the cornea to normalize its bend. For patients with increasing degrees of astigmatism, the surgeon can implant special lenses called toric intraocular lenses into the eye.

### 1.4 New Techniques For Cataract Surgeons' Eye

Cataract surgeons today have more alternatives than at any previous point in history. They have a variety of techniques for creating a capsulotomy, attacking the core, and, most importantly, regulating miosis during surgery. The results of this year's cataract surgery survey may help you gain a better understanding of how a segment of your partners is embracing these new techniques.

For example, this year, a somewhat higher percentage of surgeons than in previous years indicate they are investigating femtosecond surgery; some are still hesitant to use intraoperative wavefront aberrometry; and quadrant division is the favored procedure for separating a cataract.

These are only a few of the results from the current year's cataract surgery survey. To

remove a cataract, the surgeon makes a circular incision around the lens of the eye and then separates and removes the hazy lens using ultrasound technology. A replacement lens is then inserted into the eye. Regardless, surgeons are increasingly utilising ultra-short pulse (femtosecond) lasers. This month, 2,001 of the 12,509 surgeons who received the survey opened it (16 percent response rate), and 110 completed it entirely.

### Cataractogenesis: Contributing Factors

Numerous risk factors associated with senile cataract have been discovered. Apart from age, smoking, diabetes, and gender, cataract formation is facilitated by steroids and nitric oxide. These risk factors have been linked to a variety of cataract morphological forms.

### Smoking:

Smoking is thought to increase the risk of cataract, at least to a small extent, by increasing the amount of oxidative stress in the lens caused by free radicals created.

These free radicals may genuinely cause damage to lens proteins and the fibre cell coating in the lens when exposed to cigarette smoke [7].

Tobacco leaves contain a significant amount of cadmium (Cd), which is absorbed into the body when a human smokes or chews tobacco, and this Cd displaces bivalent metals like as zinc (Zn), copper (Cu), and manganese from superoxide dismutase (SOD), a potent cell reinforcing enzyme.

Although diabetes can affect the eyes in a variety of ways, the most prevalent cause of visual loss is cataracts. Cataractogenesis is one of the most frequent and unavoidable complications of diabetes mellitus, a severe metabolic condition characterised by hyperglycemia.

Numerous reasons for cataract formation in diabetes mellitus have been hypothesised, including elevated tissue sorbitol levels, aberrant glycosylation of lens proteins, and increased free radical generation. [8]. Female gender: Several research studies employing cross-sectional data have demonstrated that women have a higher prevalence of cataract than men.

Although the origin of gender differences in cataract incidence is unknown, it may be related to hormonal differences between women and men. Estrogen insufficiency in postmenopausal women may have a role. Recent epidemiologic evidence suggests that oestrogen and hormone replacement therapy may have a preventive effect on the prevalence of age-related cataract. The link between steroid use and cataract

improvement is well established. There appears to be consensus that the higher the steroid concentration and the longer the duration of use, the greater the risk of posterior subcapsular cataracts. Steroids impede the cation pump in the lens case, resulting in an electrolyte/water imbalance that contributes to the formation of cataracts.

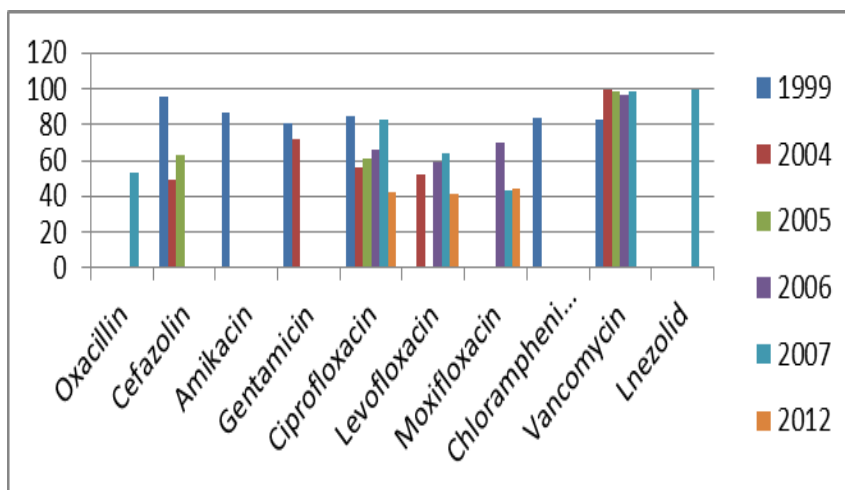


Figure 1: Histogram of most common antibiotics.

Table 1: Most common antibiotic were surveyed and tabulated in table

	Year								
	2003	2005	2008	2009	2010	2011	2011	2012	2013
Species									
Penicillin G	12	16			19				12
Oxacillin	57	63	42	61	52			54	51
Karamycin	93	92			97				
Tobramycin	91	93			93				
Gentamicin	96	90			91	99	98	99	93
Erythromycin	58	53			46	34	40	32	50
Clindamycin						84		89	73
Pristinamycin									
Doxycyclin	63								
Ciprofloxacin	75	74			71	91		93	
Ofloxacin	72	73			71				
Levofloxacin	90	81	51	53	75	33	40	31	
Moxifloxacin		92		59	82	32	40	32	
Gatifloxacin		90	70	51	86	54	56	57	
Fusidic acid						57	59	58	
Rifampicin									
Fosfomycin						98	99	99	
Telcoplasnin									
Vancomycin	97	99			99	99	99	99	99
Linezolid						98	97	99	

## Result and Discussion

Drugs have been discovered to interact with the altered lens metabolism and pathophysiology of the lens. Antitataract drugs that have been shown to be efficacious in vitro, in vivo, and in epidemiological investigations can be roughly categorised as follows:

- a. Inhibitors of aldol reductase
- b. Nonsteroidal anti-inflammatory medications (NSAIDs)
- c. Glutathione-scavenging agents
- d. Vitamins, minerals, antioxidants, and herbal medications
- d. Agents of diverse nature

**Inhibitors of aldose reductase** ARI is designed to inhibit the glucose metabolic pathways that contribute to the vascular dysfunction associated with diabetes. They have a well-established role in the prevention of diabetic cataracts in animals [9].

Numerous naturally occurring and synthetic substances have been discovered that inhibit aldose reductase. This alleged ARI association with aldose reductase impedes the synthesis of polyols.

The justification for employing sorbitol-lowering specialists has eroded over time, as the catalyst aldose reductase is remarkably sleepy when glucose is present. Additionally, mature human lenses that have been hatched in high glucose media do not acquire sorbitol. Numerous ARI have been shown in diverse experimental models to exhibit anti-cataract activity and to postpone galactose-induced cataract. Alrestatin, sorbinil, sulindac, naproxen, aspirin, tolrestat, statil, and bioflavonoids are examples of some of them.

Flavonoids are a class of naturally occurring ARI that are particularly potent. Flavonoids have been shown to inhibit aldose reductase in a few studies of in vitro animal lenses brooded in high-sugar mediums [10].

To varying degrees, the flavonoids quercetin and its 2-acetic acid derivative, quercetin, rutin, hesperidin, hesperidin chalcone, and naringin inhibited AR movement. A study is now underway to determine the ability of bioflavonoids extracted from *G. applanatum* products to suppress AR. Varma et al

continuing study has demonstrated that pyruvate treatment prevents cataract formation in diabetic rats by suppressing the AR [11]. The anti-AR activity of *Embllica officinalis* was investigated and was found to be superior than quercetin.

Similarly, vitamin C has the potential to act as an ARI, as both animal and human research indicates that it inhibits sorbitol production. *Gymnema Sylvestre's* watery extract indicated potential AR inhibition and protected the lens from osmotic damage in a sugar-induced cataract model. Among the ARI, only sorbinil has progressed to advanced clinical trials in a cataract prevention programme. Regardless, the experiment must be halted due to the presence of signs of skin rashes. Despite extensive investigation, clinical studies of sorbitol-lowering experts have failed to demonstrate their efficacy. Jonas JB, Kreissig I, Budde WM, et al. (2005) [12] described how cataract-intraocular lens (IOL) surgery is the most common ophthalmic surgery treatment performed globally. Currently, the most common route of ocular medication administration following cataract surgery is topical administration. Despite its apparent simplicity, the eye is completely protected from distant materials and drugs by a variety of productive mechanisms, including blinking, induced lacrimation, tear turnover, and nasolacrimal waste, all of which result in rapid expulsion of substances from the eye surface, and the cornea, which shapes the physical-biological obstruction. The vast majority of eye drops used after cataract surgery are not used effectively within the context of topical medication administration. Under normal conditions, the human eye can contain around 25–30l of an ophthalmic solution; however, following a single flicker, the volume is reduced to 7–10l by nasolacrimal seepage, causing the medicine to be profoundly absorbed across the nasal mucosa or gastrointestinal tract.

SP Chee (2012) [13] supplemental Cataract surgery is constantly evolving with the introduction of novel techniques, gadgets, and medicine formulations each year. At the moment, medication delivery methods include topical application during cataract surgery

(generally common). At the moment, there is no subconjunctival application. Intracameral Injection is designated for use as a prophylactic measure against infection.

The use of biodegradable embeds in the treatment of retinal problems has been proved to be quite beneficial (refractory macular edema). Following the development of sustained-discharge drug delivery frameworks such as Retisert (fluocinolone acetonide intravitreal embed 0.59 mg, Bausch+Lomb, USA) and Ozurdex (dexamethasone intravitreal embed 0.7 mg, Allergan, USA), various drug delivery technologies are being developed to treat eye diseases.

According to Liegner JT (2015) [14], more ophthalmic issue areas in which to implement these supply-based drug delivery frameworks are being investigated. Subcutaneous, subconjunctival, intracanalicular, intracapsular, transzonular, and even suprachoroidal areas have all been investigated as possible locations for drug supply or delivery frameworks. Intravitreal brimonidine supplements are being developed along the lines of the sustained-discharge dexamethasone PLGA platform for the treatment of age-related macular degeneration and as a neuroprotective strategy in the treatment of glaucoma. Intracameral injections are increasingly being employed by ophthalmologists worldwide; several manufacturers are working on novel direct-delivery frameworks or devices (including antibiotics and steroids) that can be used during the postoperative phase for cataract surgery cases. A clinical investigation of a timely plug delivery architecture that elutes moxifloxacin demonstrated an excellent profile of well-being and mediocrity.

The system of transzonular injection of moxifloxacin hydrochloride and triamcinolone acetonide is basic, according to Jeffrey T (2015) [15]. Intraoperatively, a 27-gauge obtuse bent cannula is used to inject 0.2 ccs of TriMoxiVanc or Tri-Moxi definition into the anterior vitreous area. The 27 gauge cannula is carefully introduced through the temporal clear corneal incision and then coordinated by the working surgeon underneath the iris nasally and over the fringe edge of the anterior lens

container after the capsular bag and anterior chamber have been loaded with ophthalmic viscoelastic substance (OVD). At that moment, the surgeon inserts the tip of the cannula between the zonular strands and slowly injects the drug.

Fisher BL, Potvin R (2016) [16] investigated postoperative cataract patients who had never used eye drops before and found that they had a poor installation strategy, including failing to wash hands, debasing container tips, missing the eye, and using the incorrect drop measure. This investigation revealed that the patients' risk of developing endophthalmitis, as well as other problems, increases significantly as a result of their rebelliousness. In India, this problem can become more serious in high-volume eye camps because there are fewer ophthalmic assistants/social insurance workers to educate these patients about proper eye drop application after careful consideration, and there is rarely any sullying of eye drops patients as a result of using a pin/needle to open them.

According to Rhee MK and Mah FS (2016) [17], During cataract surgery, the ophthalmologist injects a mixture of anti-infection and steroid into the transzonular space. This method only requires one administration, and the patient is not obliged to purchase a lot of eye drops for post-release prophylaxis against aggravation and infection.

Patients' compliance concerns are significantly reduced as a result of this. In the United States, a transzonular injection of anti-toxin and steroid was introduced, and since then, about 80,000 cataract procedures have been conducted using this supplementary technique.

Recent transzonular injections of antibiotics and steroids may be appropriate for various cataract patients, particularly in developing countries where there are a large number of patients requiring cataract surgery and a scarcity of ophthalmic assistants/social insurance labourers to educate them about post-cataract surgery eye drops consideration and application.

Patients who have cataract surgery should use at least three eye drops that are instilled for four months and a half after the procedure. In cases of intra-usable difficulties or prior ocular (for

example, glaucoma patients taking two or three enemies of glaucoma drugs) or basic diseases, the installation calendar of required eye drops can be further tested (for example, trouble in eye drop installation by patients with rheumatoid joint inflammation). By the way, this causes confusion among the patients because they are unable to keep track of the bearings because different drops require different times. There are also concerns about cost, compliance, and additive-induced corneal toxicity. Stringham JD, Flynn HW, et al. (2016) [18], Stringham JD, Flynn HW, et al. Patients who experience drug apprehension may benefit from dropless cataract surgery. Because the majority of patients undergoing cataract surgery are elderly, administering three to four eye drops at various times throughout the day can be difficult for them and their caregivers.

Many of these patients give up and refuse to take the meds that have been prescribed to them, and others just forget to take them. Patients who undergo dropless cataract surgery need to use eye drops frequently and can focus on their recovery. Patients can save money because there are no or few drugs to buy. This relieves patients of the financial burden of acquiring prescriptions, especially those who are on a tight budget.

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