Immediate Allergic Reaction to Intracameral Cefuroxime After Anterior Vitrectomy

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ABSTRACT

A 64-year-old man underwent anterior vitrectomy for pupil dilation and photophobia due to vitreous prolapse in his left eye. The surgery was completed without complications. At the end of the surgery, intracameral cefuroxime was injected for prophylaxis. Immediately after the injection, the patient developed dry mouth and itching all over his body. He was immediately treated with intravenous fluids, intramuscular histamine antagonists and intravenous corticosteroids. His condition improved rapidly. His family confirmed that he had a drug allergy that had developed after previous oral cefuroxime intake.

Keywords: Cefuroxime, drug hypersensitivity, vitrectomy, anaphylaxis, intracameral injection.

INTRODUCTION

Intracameral cefuroxime injection is used to reduce the rate of endophthalmitis after cataract surgery. It has shown promising results against intraocular infection according to evidence-based guidelines.[1] Intracameral injection is a safe and effective route of drug delivery.[2] It has superior bioavailability and minimal systemic and ocular toxicity compared to topical application.

Allergic reactions to medications are adverse drug reactions and are the most common cause of anaphylaxis in adults. Antibiotics are listed as one of the commonest drugs.[3] Therefore, drug allergy needs to be taken very seriously. There are few cases reporting allergic reactions to intracameral cefuroxime during cataract surgery.[4-7]

Here, we report the first case of immediate hypersensitivity reaction to intracameral cefuroxime during anterior vitrectomy.

CASE REPORT

A 64-year-old male patient underwent anterior vitrectomy in the left eye for an enlarged pupil and photophobia due to vitreus prolapse. He received an uncomplicated cataract surgery in the right eye 2 months ago. Left eye had a sulcus fixated secondary intraocular lens (IOL) implantation 8 months ago. Past medical history including allergy was questioned and revealed an intensive care unit admission due to drug allergy, but he could not remember the name of drug. According to the patient files, he used combined moxifloxacin and dexamethasone eye drops and intracameral cefuroxime injections after previous cataract surgeries.

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A standard antisepsis procedure of povidone-iodine and tropicamide eye drops for pupillary dilation were used preoperatively. Surgery was performed under local anesthesia with topical oxybuprocaine hydrochloride and intracameral lidocaine chlorhydrate. There was vitreous prolapse at the superotemporal site of the iris. The 3-piece IOL was scleral fixated and stable without adequate capsular support. Bimanual technique with two corneal entries was used, with the main port in the superotemporal area to insert the vitrector and the second port in the inferior area for the irrigation cannula. A kind of viscoelastic material containing sodium hyaluronate was used to form the anterior chamber prior to the surgery. Vitreous was totally removed from the anterior chamber using the vitrector. Finally, the corneal entries were hydrated. Intracameral cefuroxime (1mg/0.1 mL) was administered for prophylaxis. The operation was completed without complication.

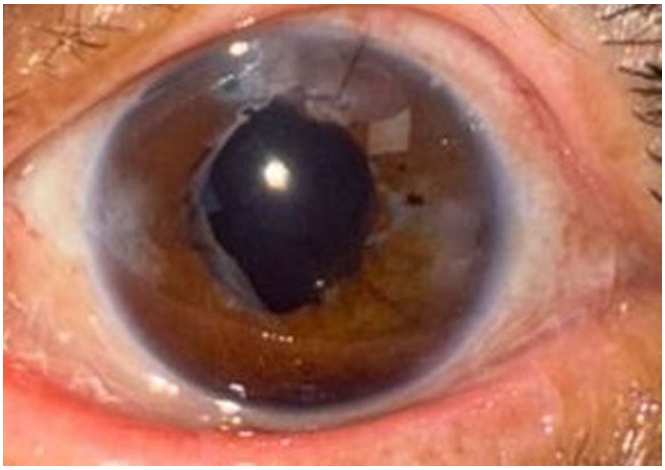

Figure 1. *Postoperative appearance of the eye in intensive care unit.*

In less than one minute after intracameral injection, the patient developed dry mouth and generalized pruritus all over his body. No intraoperative reactions like tachycardia or flushing etc. was noticed before systemic symptoms. He was decided to have an allergic drug reaction and was immediately admitted to the intensive care unit (ICU). He was alert, his blood pressure was 100/60mmHg and his heart rate was 118 per minute. He had no fever, no maculopapular rashes or swelling of the face. There were not any signs and symptoms of bronchospasm like wheezing and desaturation. He was treated with intravenous fluid, intramuscular histamine antagonist and intravenous corticosteroids and did not require intravenous epinephrine or endotracheal intubation, as the reaction was not considered severe. He stayed only one day in the ICU. The patient's condition improved rapidly after treatment. During the follow-up visit, the family confirmed the drug allergy that had previously occurred after taking oral cefuroxime.

CONCLUSION

Cefuroxime is a second-generation cephalosporin beta-lactam antibiotic. It may cause immediate hypersensitivity reactions ranging from mild urticaria to severe anaphylactic shock. Drugs, particularly beta-lactam antibiotics, are among the leading factors in the development of allergic reactions. Approximately 10% of the population has a penicillin or beta-lactam allergy.[7]

The immune system is an integral part of human defense against diseases. Protective mechanisms can sometimes cause harmful effects in the host. A hypersensitivity reaction is an exaggerated response to an allergen. Type I hypersensitivity is an immediate reaction and involves release of antibodies against the soluble antigen. Most allergic reactions occur within hours to weeks of drug ingestion and many individuals react to drugs to which they have been exposed in the past.

There are three cases of anaphylactic reaction due to intracameral cefuroxime in patients with known penicillin allergy.[3-5] Mahiat et al. reported the only case of anaphylactic reaction without past drug allergy.[6] Postoperative skin tests provided that cefuroxime was the cause of the anaphylactic reaction. All these cases developed during cataract surgeries. In this report, the patient had a history of hypersensitiviy to oral cefuroxime and developed allergic reaction during anterior vitrectomy surgery. Fortunately, the reaction was not severe and he recovered rapidly.

The intracameral pharmacokinetic studies provided information about the routes of drug elimination from the anterior chamber. The intracameral drugs are eliminated from the anterior chamber via the aqueous humour outflow or the iris-ciliary body and the blood vessel endothelia in the iris and ciliary body eventually reaching the systemic blood circulation. The volume of the agent in the anterior cham-

ber and the lipophilic or hydrophilic properties of the compound also have an impact on the absorbtion of the drug through the neighboring tissues.[8,9]

Under normal conditions, the blood-aqueous barrier restricts entry of inflammatory and immune cells and separates the anterior chamber from the bloodstream.[10] The ciliary epithelium of the ciliary body does not have an effective tight junction as in the retina and brain.[11] Therefore, the blood-aqueous barrier is not a protective as the blood-retinal barrier for limiting molecular diffusion. There are also conditions where the breakdown of the blood-aqueous barrier occurs as in ocular surgeries like anterior vitrectomy. In this way, an inward movement of inflammatory and immune cells, plasma proteins and cytokines may take place and immune cells in the anterior chamber can be exposed to antigens like cefuroxime, leading to an immediate allergic reaction.

The most effective option for prophylactic antibiotics is not yet clear in the current literature. Bowen et al. conducted a meta-analysis to assess the safety and efficacy of intracameral cefuroxime, moxifloxacin and vancomycin. It was found that cefuroxime and moxifloxacin reduced endophthalmitis rates with minimal toxicity at standard doses.[12] Arshinoff et al. reported that intracameral moxifloxacin was more effective than vancomycin and cefuroxime in preventing endophthalmitis. The authors also noted that bacterial resistance to moxifloxacin was overcome to a safe level in the anterior chamber.[13] Moxifloxacin is substituted if there is a documented allergy to cefuroxime or a potentially cross-reactive antibiotic in the beta-lactam class.[14]

Drugs can lead to a wide spectrum of systemic or local findings, ranging from toxic reactions to severe immune-mediated hypersensitivity reactions. Toxic reactions cause abnormal functioning whereas allergic reactions cause an immune response inside the body. Allergic reactions are a consequence of hypersensitivity in the immune system to agents that are not necessarily toxic on their own. The specific antibody is called IgE which usually acts to mediate the inflammatory response. A truly toxic agent will damage tissues or cells, but will not promote a IgE related response.[15]

Toxic anterior segment syndrome is an acute postoperative anterior segment inflammation. Symptoms are decreased visual acuity and ocular pain within the first 12-48 hours. Clinical signs include limbus-to-limbus corneal edema, anterior chamber cells and fibrinous inflammation. It is most likely caused by a non-infectious agent that enters into the eye during surgery and results in toxic reaction. Intracameral cefuroxime is widely used after cataract surgery. While its efficacy is well-documented, some concerns still remain regarding toxicity. Intracameral off-label cefuroxime carries a potential of inciting a toxic reaction in the the eyes with disrupted intraocular barrier. In this case, there were no signs of anterior or posterior segment inflammation or decreased visual acuity after surgery.

The first-line treatment for anaphylactic reaction is intramuscular adrenaline. Despite the standard diagnostic criteria for anaphylaxis, some clinicians still avoid the use of adrenaline. Currently, the most common treatments are hydration, antihistamines and steroids. If the underlying cause is known, it should be eliminated and supplemental oxygen and fluid therapy should be initiated.[16] Wang et al. stated that most of the patients who received adrenaline were patients who developed respiratory symptoms.[17] In the patient, there were not any signs and symptoms of respiratory distress, therefore he did not require intravenous epinephrine or endotracheal intubation.

Both penicillin and cephalosporin allergy is common in the healthy population and hospitalized patients. Although past medical history is the starting point when identifying drug allergy, the patients do not always provide a history of previous exposure. It should always be questioned and documented preoperatively. The patients who are allergic to β-lactam treatment should be observed closely after the administration of the intracameral cefuroxime.

To conclude, this report emphasizes the importance of a detailed allergy history before surgery. Even during intracameral injections, the possibility of a serious systemic reaction should be kept in mind. Finally, this is only a single case report and a general causal relationship between exposure and disease, although strongly suggested, can not be absolutely proven.

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