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Original Article

Short-term safety and efficacy of intravitreal 0.7-mg dexamethasone implants for pseudophakic cystoid macular edema

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Abstract

Aims: To determine the feasibility, safety, and clinical efficacy of intravitreal 0.7-mg dexamethasone implants (Ozurdex) in patients with refractory cystoid macular edema after uncomplicated cataract surgery.
Methods and materials: In this study, 11 eyes of 11 patients affected by pseudophakic cystoid macular edema refractory to medical treatment were treated with a single intravitreal injection of a dexamethasone implant. Follow-up visits involved Early Treatment Diabetic Retinopathy Study visual acuity testing, optical coherence tomography imaging, and ophthalmoscopic examination.
Results: The follow-up period was six months. The mean duration of cystoid macular edema before treatment with Ozurdex was 7.7 months (range, 6–10 months). The baseline mean best corrected visual acuity (BCVA) was 0.58 ± 0.17 logarithm of the minimum angle of resolution (logMAR). The mean BCVA improved to 0.37 ± 0.16 logMAR ($p = 0.008$) and 0.20 ± 0.13 logMAR ($p = 0.001$) after 1 and 3 months, respectively. At the last follow-up visit (6-month follow-up), the mean BCVA was 0.21 ± 0.15 logMAR ($p = 0.002$). The mean foveal thickness at baseline (513.8 μm, range, 319–720 μm) decreased significantly (308.0 μm; range, 263–423 μm) by the end of the follow-up period ($p < 0.0001$). Final foveal thickness was significantly correlated with baseline BCVA ($r = 0.57$, $p = 0.002$). No ocular or systemic adverse events were observed.
Conclusions: Short-term results suggest that the intravitreal dexamethasone implant is safe and well tolerated in patients with pseudophakic cystoid macular edema. Treated eyes had revealed a significant improvement in BCVA and decrease in macular thickness by optical coherence tomography.

Keywords: Intravitreal dexamethasone implant, Ozurdex, Refractory pseudophakic cystoid macular edema, Cataract surgery

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Introduction

Cystoid macular edema (CME) is a common cause of decreased vision following complicated or uncomplicated cataract surgery. It may be revealed angiographically after uneventful intracapsular and extracapsular cataract surgery in up to 60% and 30% of cases, respectively; however, the incidence of clinical CME is much lower (0.1–13%).[1–4] The rate of angiographic and clinical CME after phacoemulsification cataract surgery is even lower at 20% and 1–2%, respectively.[4,5]

CME usually resolves spontaneously in approximately 90% of eyes, and only a small subset of patients suffer permanent visual morbidity.[4,6] Considering the large number of patients undergoing cataract surgery, this small percentage of patients represents a population large enough to drive ongoing

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research to identify appropriate treatment strategies.[4] Various treatment modalities including topical, systemic, periocular, and intraocular steroids; topical non-steroidal anti-inflammatory drugs (NSAIDs); and systemic carbonic anhydrase inhibitors (CAIs) have been used with different success rates to treat pseudophakic CME.[3–5]

The pathogenesis of pseudophakic CME is thought to be multifactorial. However, the major etiology appears to involve inflammatory mediators that are upregulated in the aqueous and vitreous humors after surgical manipulation. Inflammation breaks down the blood–aqueous and blood–retinal barriers, which leads to increased vascular permeability.[7] Eosinophilic transudate accumulates in the outer plexiform and inner nuclear layers of the retina to create cystic spaces that coalesce to form larger pockets of fluid. In chronic CME, lamellar macular holes and subretinal fluid may also form.[1]

Glucocorticoids such as dexamethasone exert their anti-inflammatory effects by influencing multiple signal transduction pathways, including VEGF.[8–11] By binding to cytoplasmic glucocorticoid receptors, corticosteroids in high doses increase the activation of anti-inflammatory genes, whereas, at low concentrations, they play a role in the suppression of activated inflammatory genes.[9–12]

The dexamethasone implant (Ozurdex; Allergan, Inc., Irvine, CA) is a novel approach approved by the United States Food and Drug Administration (FDA) and by the European Union (EU) for the intravitreal treatment of macular edema (ME) after branch or central retinal vein occlusion and for the treatment of noninfectious uveitis affecting the posterior segment of the eye.[13–15] Furthermore, its clinical efficacy has been documented in other diseases, such as diabetic ME and persistent ME associated with uveitis or Irvine–Gass syndrome.[16–21] Compared with other routes of administration of dexamethasone analogs, intravitreal administration of this implant has been found to be more advantageous.[22] The key features of the drug delivery system (DDS) are the sustained-release formulation of the poly lactic acid-co-glycolic acid (PLGA) matrix material, which dissolves completely in vivo, and the single-use applicator for intravitreal placement.[23]

The primary purpose of this study was to evaluate the effectiveness, safety, and feasibility of a single intravitreal injection of Ozurdex over 6 months in patients with persistent CME resulting from Irvine–Gass syndrome following uneventful cataract surgery.

Subjects and methods

This retrospective case series comprised 11 eyes of 11 patients with CME after cataract surgery refractory to current standard treatment who received a single injection of Ozurdex between June 2011 and March 2014 at King Fahd Hospital of the University, Khobar, Saudi Arabia. The study was approved by the Institutional Review Board of the University of Dammam and the ethics committee.

Informed consent was obtained from the patients. The nature of off-label use of Ozurdex for CME after cataract surgery and its potential side effects were extensively discussed with the patients before obtaining informed consent. Inclusion criteria included having previously undergone a wide range of treatment options, including oral CAIs, topical therapy with NSAIDs and corticosteroids, as well as intravitreal treatment either with anti-VEGF agents or with intravitreal triamcinolone. Refractory CME was defined as persistent CME with foveal thickness (FT) more than 250 μm and intraretinal cystic changes revealed by spectral-domain optical coherence tomography (SD-OCT), lasting for at least 90 days after initiation of treatment. Exclusion criteria included diagnosis of systemic disease such as diabetes mellitus, history of other intraocular surgery before cataract extraction, glaucoma, elevated intraocular pressure (IOP), and vitreoretinal pathology such as epiretinal membrane or vitreomacular traction in the study eye, which could prevent improvement in visual acuity.

In all patients, the best corrected visual acuity (BCVA) was measured by using Early Treatment Diabetic Retinopathy Study charts and an ophthalmic examination, including slit-lamp biomicroscopy. Fluorescein angiography was also performed, showing leakage in the central region typical for CME. Baseline central retinal characteristics were analyzed by optical coherence tomography SD-OCT (Stratus OCT-3, Humphrey-Zeiss, San Leandro, CA) through a dilated pupil by a retina specialist. Retinal thickness of the 1.0-mm central retina was obtained from the macular thickness map for use in further calculations. Patients received a dexamethasone implant in the study eye at the baseline visit (day 1). The eye was prepared in the standard manner, using 5% povidone/iodine and topical antibiotics (0.3% ciprofloxacin). A single-use applicator with a 22-gauge needle was used to place a dexamethasone implant in the vitreous chamber through a self-sealing scleral injection. All injections were performed in the operating room. Following the injection, IOP and retinal artery perfusion were assessed, and patients were instructed to use topical antibiotics for 5 days (0.5% moxifloxacin). Patients were scheduled for regular postsurgical follow-up visits at day 2 and 1, 3, and 6 months. During these follow-up visits, the patients underwent BCVA examination, OCT imaging, and ophthalmoscopic examination.

The primary efficacy outcome measure was the change in BCVA and FT from baseline to 6 months. Statistical calculations were performed using the Statistical Package for Social Sciences (version 20.0; SPSS Inc., Chicago, IL). Mean changes from baseline FT and BCVA (converted to the logarithm of the minimum angle of resolution [logMAR]) were analyzed using paired t-tests. A 2-tailed test with an α level of 0.05 was used for all comparisons.

Results

This study included 11 eyes of 11 consecutive patients who were followed for 6 months. The baseline characteristics of the patients and study eyes are listed in the Table 1. The patients' mean age was 59.4 ± 9.3 years, and 64% (7 of 11 patients) were men. All eyes had clinical CME at baseline examination. Patients were unresponsive to previous treatment with NSAIDs eyedrops, systemic CAIs, systemic or topical steroids, as well as intravitreal treatment either with anti-VEGF agents or with intravitreal triamcinolone. The mean duration of CME before treatment with Ozurdex was 7.7 months (range, 6–10 months).

At baseline, the mean FT was 513.8 ± 134.9 μm. FT values decreased to 371.6 ± 91.9 μm (mean ± SD, $p = 0.001$) at 1 month and 302.6 ± 50.9 μm ($p = 0.002$) at 3 months, and increased slightly to 308.0 ± 54.5 μm ($p = 0.031$) at the end