



Uneventful Anterior Migration of Intravitreal Dexamethasone Implant in a Diabetic Patient with Persistent Diabetic Macular Edema

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Abstract

Purpose: We report this case of a patient with anterior chamber migration of intravitreal dexamethasone implant as well as its management and outcome.

Methods: The patient had the following sequence of events: Lasik surgery 10 years ago, OD, rheumatogenous retinal detachment (RRD) surgery 3 years ago with pars plana vitrectomy (PPV), endolaser and silicone oil injection. Followed after 1 year by OD, cataract surgery with PC, IOL and silicone oil removal. Later on she had diagnosed as persistent diabetic macular edema (DME) with several Anti-VEGF intravitreal injections ended by Ozurdex implants. Finally 6 weeks later and history of YAG laser posterior capsulotomy she had done implant surgical removal after anterior chamber migration and corneal edema.

Results: Dexamethasone implant had been surgically explanted from the eye 6 weeks after insertion without any complication.

Conclusion: A surgical approach for removal of Ozurdex implant is essential if the patient suffering corneal edema due to implant anterior segment migration prior to corneal decompensation. Physicians should inform patients with PPV to the risk of implant migration. It is crucial to emphasize the importance of seeking immediate attention in the event of any decrease or change in vision as seek urgent medical consultation and timely intervention can be critical in preventing potential complications.

Keywords: Anterior Chamber Migration; Diabetic Macular Edema; Intravitreal Ozurdex Implant

Abbreviations

RVO: Retinal Vein Occlusion; IOL: Intraocular Pressure; A/C: Anterior Chamber; PPV: Pars Plana Vitrectomy; PC IOL: Posterior Chamber Intraocular Lens; DSAEK: Descemet Stripping Automated Endothelial Keratoplasty; PI: Peripheral Iridotomy; CMT: Central Macular Thickness; RRD: Rheumatogenous Retinal Detachment; DME: Diabetic Macular Edema; VEGF: Vascular Endothelial Growth Factor; BCVA: Best Corrected Visual Acuity; I/A: Irrigation Aspiration; A/C: Anterior Chamber; OCT: Ocular Coherence Tomography; Nd: YAG: Neodymium: Yttrium Aluminum Grant; PC: Posterior Capsule; PCO: Posterior Capsular Opacification

Introduction

The dexamethasone intravitreal implant (Ozurdex, Allergan Inc, Irvine, CA, USA) is a biodegradable, sustained-release device

containing 0.7 mg of dexamethasone. It has been approved as a treatment option for macular edema secondary to retinal vein occlusion (RVO), noninfectious uveitis involving the posterior segment, and diabetic macular edema (DME) [1-3]. The implant's mechanism of action involves the potent anti-inflammatory properties of dexamethasone, delivered in a controlled and sustained manner through a solid polymer drug delivery system. This allows for prolonged therapeutic effects while minimizing systemic exposure.

In 2014, Ozurdex received FDA approval for DME treatment, and since then, its usage has increased, particularly among retina specialists managing cases of DME unresponsive to anti-vascular endothelial growth factor (anti-VEGF) therapy or in patients with vit-

rectomized eyes, where anti-VEGF agents may be less effective due to increased drug clearance [4]. Scaramuzi, *et al.* [5] also noted that the use of Ozurdex in DME can result in long term meaningful benefits while avoiding the significant side effects expected after intraocular corticosteroid injections. Despite its clinical benefits, Ozurdex is associated with certain risks. In rare instances, the implant may migrate into the anterior chamber, a complication that can lead to vision-threatening outcomes, including permanent corneal decompensation. Several large scale studies conducted have shown the overall prevalence of this complication varying from 0.63% to 1.60%, with the incidence being significantly higher in eyes affected by established risk factors. This risk is particularly pronounced in aphakic and pseudophakic eyes, where the absence of the natural lens allows the implant to bypass anatomical barriers and move forward. Initial reports identified aphakia as the primary risk factor for anterior chamber migration, although other factors, such as compromised capsular integrity or large peripheral iridotomies, may also contribute to this phenomenon [6-8].

Preventative strategies, such as careful patient selection and thorough preoperative assessment of ocular anatomy, are essential to mitigate these risks. For high-risk patients, alternative treatment modalities should be considered. Additionally, prompt recognition and intervention in cases of anterior chamber migration are critical to preserving vision and preventing permanent corneal damage. Anterior chamber migration of the dexamethasone intravitreal implant, although rare, can also occur in vitrectomized eyes with compromised posterior capsule integrity or zonular weakness and dehiscence. This complication can lead to persistent corneal edema and ocular hypertension, both of which pose a threat to long-term visual outcomes if not promptly addressed. Management strategies for such cases often begin with positional maneuvers, such as advising the patient to assume specific head positions to encourage the implant to migrate back into the vitreous cavity. However, if these maneuvers fail, surgical intervention becomes necessary. Options include surgical reinsertion of the implant into the vitreous cavity or, in cases where reinsertion is not feasible, complete removal of the implant to prevent further complications. Early recognition and prompt management are critical to minimizing the risk of irreversible corneal decompensation and preserving visual function.

Case Report

A 45-years old female diabetic patient has a history of Lasik surgery 10 years ago and known for right eye rhegmatogenous retinal detachment, was treated with pars plana vitrectomy, endolaser and silicone oil injection in March 2020. After one year the pa-

tient underwent a cataract surgery during silicone oil removal and posterior chamber intraocular lens (IOL) in April 2021. Later on the patient presented with DME and several Aflibercept 2mg/0.05 ml, anti- VEGF was injected for a period of 6 Months. The patient considered as a case of persistent DME and ended by First successful Ozurdex intravitreal implant on 4 April, 2023. Later on Second Ozurdex implant was injected. Unfortunately, the patient developed OD, posterior capsule opacification (PCO) and she did YAG laser posterior capsulotomy (PC). About 6 weeks later with patient history of diving sports activity the patient presented by drop of vision as OD, best corrected visual acuity (BCVA) was 20/400 and intra-ocular pressure was within normal (20 mm Hg) on Goldman applanation tonometry, Slit lamp examination revealed central and lower third corneal edema due to migration of Ozurdex implant on the anterior chamber with corneal touch as shown in (Figure 1). The decision for implant surgical removal was taken and the patient scheduled for urgent surgical interference to avoid corneal decompensation and possible rise of IOP.

The surgical technique

- The patient underwent the surgery under peri-bulbar local anesthesia
- Making one temporal clear corneal incisions 1.2 mm 90 degrees apart from the implant using super knife (Figure 2).
- Injection of viscoelastic material through the incision to protect the cornea and to make A/C deeper
- Dislodging the implant by the tip of viscoelastic cannula as shown in (Figure 3).
- Trial to grasp the implant with micro forceps and bring it near to the wound for explantation, unfortunately the implant was fragile and easily broken (Figure 4).
- Injection of more of viscoelastic material to facilitate implant navigation towards the wound for visco-expression (Figure 5).
- Aspiration of the Ozurdex implant using double way cannula for I/A (Figure 6).
- Irrigation aspiration of the viscoelastic material
- Tight wound hydration using BSS (Figure 7).
- Checking wound integrity and sub-conjunctival antibiotic injection (Figure 8).

On the first day postoperatively slit lamp eye examination revealed that the corneal edema was still evident, wound coapted and A/C was deep and quiet, intraocular pressure was 18 mm Hg. Two weeks postoperatively, the patients OD, BCVA was improved to 20/100, and corneal edema had resolved completely. Corneal

Figure 1: Ozuedex implant on AC touching the cornea with corneal edema.

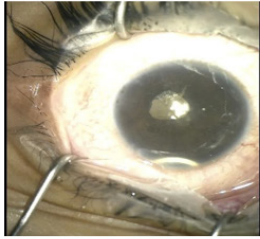


Figure 2: Corneal incision with superknife.

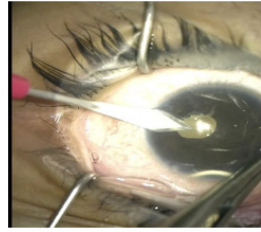


Figure 3: Dislodging the implant with tip of viscoelastic cannula.

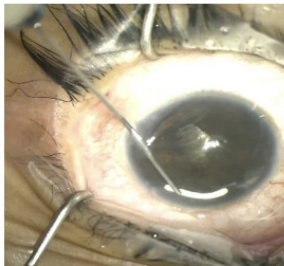


Figure 4: Grasping the implant with microforceps.

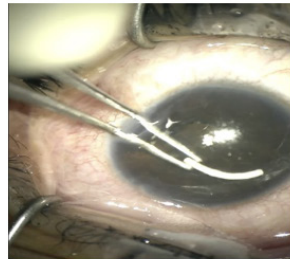


Figure 5: The implant moved towards the corneal wound.



Figure 6: Trial of implant aspiration with IA cannula.

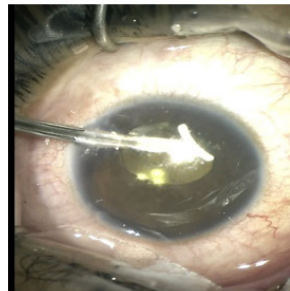


Figure 7: Closure of corneal wound with hydration.

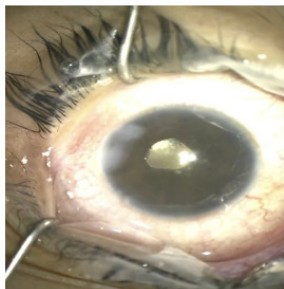
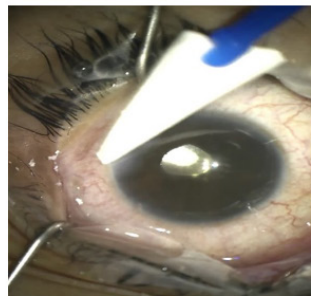


Figure 8: Checking of corneal wound integrity.



endothelial cell density measured and it was 1800 cells/mm² in his right eye and 2200 cells/mm² in her left eye. OD, OCT showed increased macular edema with CMT rising from 340 to 440 μm. Following careful retinal team discussion, we found that the best course of action would be a repeated injection of Ani-VEGF, Aflibercept 2mg/0.05 ml, and augmented with Triamcinolone acetonide (TA) 4 mg/0.1 ml intravitreal injection. In follow-up visits, the patient has improvement and subsiding of the DME.

Discussion

It's notable that both Khurana, *et al.* and Kocak, *et al.* [8,9] have identified similar risk factors associated with anterior chamber migration of the Ozurdex implant, particularly focusing on patients who have undergone previous vitrectomy. Other studies reported the common risk factors for implant migration include aphakic or pseudophakic eyes, history of vitrectomy, reconstructed iris, zonular dehiscence and open or defective posterior lens capsule [10-14].

The correlation between surgical history and implant migration is crucial for clinicians to consider when managing such patients. In our case, the patient's history of pars plana vitrectomy, YAG laser PC and presence of pseudophakia align with the risk factors outlined in these studies. This emphasizes the need for careful monitoring and potentially preemptive measures in patients with similar profiles to prevent complications associated with implant migration. Tsoutsanis and Kapantais reported that the majority (83%) of the patients experienced serious complications following anterior migration of the Ozurdex implant. These complications primarily included corneal edema, which can severely impact visual acuity and patient comfort. The remaining 17% showed either no complications or only a mild rise in intraocular pressure [15]. Continued research into the mechanisms of migration and the development of strategies to mitigate risks in high-risk patient groups could further enhance patient safety and treatment outcomes in cases involving corticosteroid implants like Ozurdex. Furthermore, it may be beneficial to explore alternative management strategies or devices that cater to the unique needs of these patients, taking into consideration their surgical history and anatomical changes resulting from previous interventions.

As the corneal edema is the most serious complication of Ozurdex implant migration in the anterior chamber, and it has been reported in 89% of patients at presentation. Furthermore, the corneal edema may not resolve spontaneously despite implant removal in 71% of cases, and 43% may need corneal graft [8]. Endothelial decompensation is either due to chemical toxicity from

any implant component (dexamethasone, glycolic acid, or lactic acid) or to endothelial touch, where the direct mechanical trauma from a rigid object is responsible for corneal edema. Specular microscopy has demonstrated loss of corneal endothelial cells with the anterior chamber implant migration [16]. High doses of dexamethasone can be cytotoxic and can induce apoptosis and necrosis of corneal endothelial cells [17]. It is clear as we did why urgent surgical intervention to remove the migrated implant is deemed necessary. Prompt surgical action can potentially mitigate the risk of persistent corneal edema and reduce the likelihood of requiring more invasive procedure such as a corneal graft. In contrast to Zafar, *et al.* They reported for such a case a 12 weeks conservative approach with regular monitoring in the situation of a quiet anterior segment without any corneal decompensation. Their case had no corneal edema at presentation and the implant was already degraded enough with less possibility of corneal toxicity as well as their patient was elder male, 74 years old with vulnerable cornea and history of Descemet stripping automated endothelial keratoplasty (DSAEK). They consider the risks of surgical intervention, including endophthalmitis, damage to the IOL, or failure of the corneal graft. They decided close observation and provided enough time for the implant to dissolve without causing any complication to the involved eye [18].

Other management options include observation, supine positioning, Nd: YAG Laser fragmentation and surgical removal involving either forceps, aspiration of implant's fragments, or repositioning into the posterior chamber. Pupil constriction with pilocarpine is indicated primarily in high-risk patients or following repositioning in order to minimize the risk of repeat anterior chamber implant migration, but recurrence of anterior migration can still happen [8]. Various management options were employed to address the complications resulting from anterior migration. The most common approach was surgical removal, chosen in 54% of the cases. Surgical repositioning, whether through surgical techniques (27%) or non-surgical means (14%) like postural maneuvering and ocular massage, was utilized in 41% of the cases. Only 5% of the patients followed a "watch and wait" approach, with the implant eventually dissolving on its own [15]. If the implant was friable and so can be a challenge to remove in one piece, thus it can be aspirated with a vitrectomy cutter [19]. Also a slit-lamp procedure was used where the implant is repositioned posteriorly using a needle is an option as well, but the implant may come back into the anterior chamber [20]. Investigators have proposed a technique of scleral fixation of the Ozurdex implant in the vitreous cavity with a 10-0 polypropylene suture in high-risk patients [21].

Under normal circumstances the aqueous humor would hold the implant in place. In our case, the eye was vitrectomized, allowing the implant to move and migrate anteriorly unopposed through the YAG laser opening in the posterior capsule and then through the pupil even the eye was pseudophakic, the implant circumvent the pupil and reached the anterior chamber (AC) especially if there is zonular weakness or disrupted posterior lens capsule. Hence the implant settled on the AC either due to direct contact to the corneal endothelium or due chemical toxicity from any implant component, there was corneal edema at patient presentation, although the intraocular pressure remained within normal limit, we decided that implant surgical removal was the best management option.

In Conclusion

The management of the Ozurdex implant migration is multifaceted and tailored based on the specific clinical scenario, including the extent of corneal damage and patient history. Anterior segment migration of Ozurdex implant can happen in vitrectomized eyes and in eyes with zonular dehiscence or compromised posterior capsule. Management of this situation is crucial, and the diagnosis may be delayed due to the increased follow-up intervals allowed by these injections and so close observation and short follow up intervals is preferable. Urgent surgical intervention if implant migration noticed with presentation of corneal edema is critical to minimize complications and preserve visual function. Regular follow-up and patient education about potential risks and benefits of each management option are also essential to avoid corneal decompensation as presented in this case report.

Statement of Ethics

The patient was informed and consented to the use this clinical data for publication purposes, and ethical approval was granted.

Competing Interests

The authors have declared that no competing interests exist.

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Author Contributions

Methodology, writing original draft, preparation SH E; Surgeon, review and editing, A M A and Ab M A. All authors have read and agreed to the published version of the manuscript.

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Availability of Data and Video

The data and video used for the current case report study is available from the corresponding author on reasonable request.

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