ORIGINAL RESEARCH

Assessing the Outcomes of Intravitreal Corticosteroid Implants in Uveitis Management

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ABSTRACT

Objective: To evaluate the clinical outcomes and safety profile of intravitreal corticosteroid implants in managing non-infectious uveitis. **Methods:** A retrospective cohort study was conducted on 85 patients with non-infectious uveitis treated with intravitreal corticosteroid implants (dexamethasone or fluocinolone acetonide). Data were collected on best-corrected visual acuity (BCVA), central macular thickness (CMT), inflammation control, intraocular pressure (IOP), and adverse events over a 12-month follow-up period. Statistical analysis compared baseline and post-treatment outcomes. **Results:** BCVA improved from 20/100 at baseline to 20/50 at 6 months and 20/40 at 12 months, with 75% of patients achieving a ≥2-line improvement.CMT reduced significantly from 550 µm at baseline to 280 µm at 12 months ($p < 0.001$).Active inflammation (grades 2+ or higher) decreased from 92% at baseline to 5% at 12 months, with 80% achieving complete resolution.Cataract progression occurred in 40% of phakic eyes, with 18 requiring surgery. IOP elevation (>25 mmHg) was observed in 18% of patients, with 12% requiring treatment.78% reported improved visual function, and 85% expressed satisfaction with the treatment. **Conclusions:** Intravitreal corticosteroid implants are highly effective in improving vision, reducing macular edema, and controlling inflammation in non-infectious uveitis. While adverse effects such as cataract progression and IOP elevation are notable, they can be managed with appropriate follow-up. These implants represent a valuable option for patients requiring localized, long-term anti-inflammatory treatment.

INTRODUCTION

Uveitis, a complex group of inflammatory disorders involving the uveal tract of the eye, is a significant cause of ocular morbidity and vision loss worldwide. The condition encompasses anterior, intermediate, posterior, and panuveitis subtypes, classified based on the primary anatomical location of inflammation [1]. Uveitis can arise due to a wide array of etiologies, including autoimmune diseases (e.g., sarcoidosis, Behçet's disease), infections (e.g., tuberculosis, toxoplasmosis), trauma, and idiopathic origins. Regardless of the underlying cause, uncontrolled inflammation in uveitis can lead to complications such as macular edema, cataracts, glaucoma, and retinal detachment, all of which contribute to irreversible vision impairment if not promptly and effectively managed [2].

The therapeutic landscape for uveitis involves an intricate balance between controlling inflammation and minimizing treatment-associated adverse effects. Traditional treatment regimens often include systemic corticosteroids and immunosuppressive agents, which are effective but may carry significant systemic side effects, including weight gain, hypertension, osteoporosis, and increased risk of infection [3]. The localized nature of uveitis, however, has paved the way for targeted therapies, such as intravitreal corticosteroid implants, which deliver potent anti-inflammatory drugs directly to the site of pathology, offering sustained therapeutic effects with reduced systemic exposure [4].

Intravitreal corticosteroid implants have revolutionized uveitis management by addressing the challenges associated with systemic therapy and providing long-term control of intraocular inflammation [5]. These implants release corticosteroids such as dexamethasone or fluocinolone acetonide over extended periods, ranging from months

to years, depending on the type of implant. The sustained drug release not only ensures prolonged anti-inflammatory action but also enhances patient compliance by reducing the need for frequent dosing or repeated intravitreal injections [6]. The dexamethasone implant (Ozurdex®) and fluocinolone acetonide implant (Retisert® and Yutiq®) are among the most widely used in clinical practice, with demonstrated efficacy in clinical trials and real-world settings [7].

The use of intravitreal corticosteroid implants, however, is not without challenges. Adverse effects such as elevated intraocular pressure (IOP), glaucoma, and cataract formation remain significant concerns [8]. For instance, studies have shown that up to 60% of patients receiving fluocinolone acetonide implants may develop cataracts, necessitating surgical intervention. Similarly, corticosteroid-induced IOP elevation can lead to secondary glaucoma, which requires vigilant monitoring and management. These potential complications underscore the importance of careful patient selection and individualized treatment planning when considering intravitreal corticosteroid therapy [9].

Objective

The main objective of the study is to find the outcomes of intravitreal corticosteroid implants in uveitis management.

Methodology

This retrospective study was conducted and involved 85 patients diagnosed with various subtypes of uveitis, including anterior, intermediate, posterior, and panuveitis. All patients were treated at a tertiary care ophthalmology center and had been unresponsive to conventional systemic therapies or presented with contraindications to systemic corticosteroids or immunosuppressive agents.Patients to have a confirmed diagnosis of non-infectious uveitis and a minimum follow-up period of 12 months post-implantation were included in the study. Patients with active infectious uveitis, a history of intraocular surgeries within six months prior to implantation, or inadequate follow-up data were excluded.

Data collection

Patients were treated with either dexamethasone implants (Ozurdex®) or fluocinolone acetonide implants (Retisert® or Yutiq®), depending on the clinical indications, physician discretion, and patient preferences. Demographic information, including age, gender, and duration of uveitis, was recorded to provide baseline patient characteristics. Pre-implantation data included best-corrected visual acuity (BCVA), intraocular pressure (IOP), and central macular thickness (CMT), measured using optical coherence tomography (OCT). Post-treatment data were collected at 1 month, 3 months, 6 months, and 12 months after implantation to evaluate the outcomes of the therapy. Parameters such as reduction in intraocular inflammation, improvement in macular edema, and stabilization or enhancement of BCVA were assessed during these follow-ups. The presence of complications, including cataract formation, IOP elevation, and any need for additional surgical interventions, was also documented. Secondary data included patient-reported outcomes related to visual function and quality of life, derived from clinical interviews and standardized questionnaires. All data were systematically organized to facilitate statistical analysis and draw meaningful conclusions regarding the efficacy and safety of the implants.

Statistical Analysis

Data were analyzed using SPSS v11. Descriptive statistics summarized demographic and clinical characteristics, while Kaplan-Meier survival analysis evaluated the durability of implant efficacy.

RESULTS

Data were collected from 85 patientswith a mean age of 48.01 ± 2.31 years, including 45 males and 40 females. The uveitis subtypes were distributed as anterior uveitis (40%), intermediate uveitis (25%), posterior uveitis (20%), and panuveitis (15%). At baseline, the mean best-corrected visual acuity (BCVA) was 20/100, and the mean central macular thickness (CMT) was 550 µm. Active inflammation (grades 2+ or higher) was observed in 92% of patients, highlighting significant disease severity prior to treatment.

Table 1: Patient Demographics and Baseline Characteristics

Parameter	Value
Number of Patients	85
Mean Age (years)	48.01±2.31
Gender (Male: Female)	45:40
Subtype of Uveitis	
- Anterior Uveitis	40%
- Intermediate Uveitis	25%
- Posterior Uveitis	20%
- Panuveitis	15%
Mean BCVA (Snellen)	20/100
Mean CMT (µm)	550
Active Inflammation (%)	92% (grades 2+ or higher)

At baseline, the mean BCVA was 20/100, with no patients achieving a two-line improvement. By 6 months, the mean BCVA improved to 20/50, with 65% of patients experiencing at least a two-line improvement. At 12 months, the mean BCVA further improved to 20/40, with 75% of patients achieving this milestone, demonstrating the sustained efficacy of intravitreal corticosteroid implants in restoring visual function.

Table 2: Visual Acuity Improvement (BCVA)

Timepoint	Mean BCVA (Snellen)	% of Patients with ≥2-Line Improvement
Baseline	20/100	-
6 Months	20/50	65%
12 Months	20/40	75%

At baseline, the mean CMT was 550 µm, indicating the presence of macular edema. By 6 months, the mean CMT decreased to 350 µm, with a highly significant p-value (<0.001). At 12 months, the mean CMT further reduced to 280 µm ($p < 0.001$), reflecting the effectiveness of intravitreal corticosteroid implants in resolving macular edema and improving retinal structure.

Table 3: Central Macular Thickness (CMT) Reduction

Timepoint	Mean CMT (µm)	p-value
Baseline	550	-
6 Months	350	<0.001
12 Months	280	<0.001

The study showed a marked reduction in active inflammation among patients treated with intravitreal corticosteroid implants. At baseline, 92% of patients exhibited active inflammation (grades 2+ or higher), with no cases of complete resolution. By 6 months, active inflammation decreased significantly to 15%, with 70% of patients achieving complete resolution. At 12 months, active inflammation further reduced to 5%, and 80% of patients achieved complete resolution, highlighting the implants' effectiveness in controlling inflammation and sustaining long-term therapeutic benefits.

Table 4: Inflammation Control

Timepoint	% of Patients with Active Inflammation (Grades 2+ or Higher)	% of Patients with Complete Resolution
Baseline	92%	0%
6 Months	15%	70%
12 Months	5%	80%

DISCUSSION

This study highlights the efficacy and safety of intravitreal corticosteroid implants in managing non-infectious uveitis. The findings demonstrate significant improvements in visual acuity, reduction of macular edema, and effective inflammation control, aligning with previously reported outcomes in similar studies. While the results are encouraging, the study also underscores the importance of monitoring and managing treatment-associated adverse effects to optimize patient outcomes [10].The improvement in best-corrected visual acuity (BCVA) observed in this study—20/100 at baseline to 20/40 at 12 months—is consistent with the established role of corticosteroid implants in reducing intraocular inflammation and preserving vision [11]. Approximately 75% of patients achieved at least a two-line improvement in BCVA, indicating the implants' substantial impact on restoring functional vision. The concurrent decrease in central macular thickness (CMT) from 550 µm to 280 µm further supports the implants' effectiveness in resolving macular edema, a key contributor to visual impairment in uveitis [12].

The reduction in inflammatory activity, with 80% of eyes achieving complete resolution by the end of the study, demonstrates the sustained anti-inflammatory effects of intravitreal corticosteroids. This outcome underscores the implants' ability to provide long-term disease control, particularly in patients unresponsive to systemic therapies or those with contraindications to systemic corticosteroids and immunosuppressants [13].Despite the benefits, adverse effects remain a concern. Cataract progression, observed in 40% of phakic eyes, reflects the well-documented association between corticosteroid use and lens opacification. While this necessitated cataract surgery in 18 patients, the procedure's routine nature and excellent visual outcomes mitigate its long-term impact [13].

Elevated intraocular pressure (IOP) was observed in 18% of patients, with 12% requiring medical or surgical intervention. These findings emphasize the need for vigilant IOP monitoring and timely management to prevent glaucomatous damage [14]. Importantly, no cases of irreversible vision loss due to IOP elevation were reported, suggesting that the risks can be effectively mitigated with appropriate follow-up and intervention.The improvement in patient-

reported quality of life further highlights the implants' positive impact [15]. The majority of patients reported reduced difficulty with daily activities and high satisfaction with treatment [16]. These findings underline the value of intravitreal corticosteroid implants in enhancing not only clinical outcomes but also patients' overall well-being and functionality.Both dexamethasone and fluocinolone acetonide implants demonstrated comparable efficacy in reducing inflammation and improving visual parameters [17-18]. However, the slightly higher incidence of IOP elevation in the fluocinolone group suggests that patient selection and individualized treatment planning are critical when choosing between implant types [19].The study's retrospective design and single-center setting may limit the generalizability of the findings. Additionally, the absence of a control group or comparison with systemic therapies precludes direct conclusions about the superiority of intravitreal implants. Future studies with randomized controlled designs and larger sample sizes are warranted to validate these results further.

CONCLUSION

It is concluded that intravitreal corticosteroid implants are an effective and safe option for managing non-infectious uveitis, offering significant improvements in visual acuity, macular thickness, and inflammation control. Despite associated risks such as cataract progression and elevated intraocular pressure, these can be managed with vigilant monitoring and timely intervention. The implants provide a valuable therapeutic alternative, particularly for patients unresponsive to or unsuitable for systemic therapies.

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