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CASE REPORT PEER REVIEWED | OPEN ACCESS

Use of topical steroids in the setting of corneal subepithelial deposits due to multiple myeloma

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ABSTRACT

Introduction: The aim of this case report was to describe the use of topical steroids in a patient with subepithelial corneal deposits most likely due to multiple myeloma.

Case Report: A 58-year-old white female with multiple myeloma was referred to a cornea sub-specialty clinic at Massachusetts Eye and Ear for intermittent blurred vision and development of peripheral corneal deposits in both eyes. On examination, bilateral, superior peripheral corneal deposits were identified with an otherwise clear cornea. There was no corneal neovascularization, epithelial defect, or stromal gelatinous changes. The anterior chamber was quiet without any cell or flare. Dilated fundus examination was unremarkable. The corneal deposits did not resemble nodules found in Salzmann nodular degeneration or pannus from ocular rosacea/contact lens wear/trauma. Given that the patient had no prior history of eye problems or trauma, it was believed that the corneal subepithelial deposits were inflammatory changes due to her relatively recent (within one year) diagnosis of multiple myeloma. The patient was started on loteprednol etabonate 0.5% ophthalmic suspension one drop two times daily in both eyes and one month follow-up was arranged. At her one-month visit, the corneal deposits were much improved and, subsequently, her loteprednol drops were reduced to one drop nightly in both eyes for two months followed by 1 drop Monday/Wednesday/Friday in both eyes for two months.

Conclusion: We describe an interesting case in which low dose topical steroid was utilized and may have contributed toward the stabilization and regression of peripheral subepithelial corneal deposits most likely due to multiple myeloma. It is possible that some of the observed improvement in the patient's corneal deposits were in part due to her systemic treatment of multiple myeloma. Further studies are needed to establish the impact of topical steroids in this patient population, especially in more severely affected eyes.

Keywords: Corneal deposits, Multiple myeloma, Subepithelial deposits, Topical steroids

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INTRODUCTION

Multiple myeloma is one of the most common hematologic malignancies [1]. It is characterized by the abnormal accumulation of clonal plasma cells within the bone marrow [2]. As the disease progresses, it can lead to the growth of destructive bone lesions which may eventually result in acute kidney injury, hypercalcemia, and anemia [3]. Multiple myeloma is the second most common blood cancer after non-Hodgkin's lymphoma, and it can be attributed to 2% of all cancer-related mortality [1]. While the most common organs targeted by the disease are the bone and kidney, it has been known to manifest in the eye [1, 4]. The most common

mechanism governing ophthalmic manifestation of multiple myeloma is through neoplastic proliferation of plasma cells in the eye resulting in ocular plasmacytoma [1, 4]. However, immunoglobulin deposition (usually light chains) can also occur within the cornea resulting in the formation of crystals or nodular deposits which can occur at any layer of the cornea [4–8]. Previous case reports document treatment with superficial keratectomy and even penetrating keratoplasty in patients with visual decline from deposits in the setting of multiple myeloma [7, 8]. Although corneal findings have been described in patients with multiple myeloma, we describe an interesting case in which topical steroid was utilized and may have contributed toward the management of peripheral corneal deposits due to the disease.

CASE REPORT

A 58-year-old white female with a history of multiple myeloma (diagnosed <1 year prior to presentation) presented to a Massachusetts Eye and Ear comprehensive clinic for intermittent blurred vision in both eyes. The patient reported no history of eye problems, eye trauma, or prior eye surgery. She also did not report any eye pain but noted that her vision had been progressively worsening ever since her diagnosis of multiple myeloma, which was confirmed by oncology service after serum protein electrophoresis revealed markedly high lambda free light chains (10.646 mg/L).She was on the following chemotherapy regimen for her multiple myeloma: (1) Isatuximab 10 mg/kg intravenous (IV) days 1, 15; (2) Bortezomib 1.3 mg/kg subcutaneous (SC) days 1, 15; (3) Lenalidomide 25 mg per os (PO) days 1–21/28; (4) Dexamethasone 20 mg days 1, 15; (5) Intravenous immune globulin (IVIG) monthly. She was also taking hydroxychloroquine (200 mg twice a day for 0.5 years) for inflammatory bursitis. On examination, her best corrected visual acuity was 20/25 oculus dexter (OD) and 20/25-1 oculus sinister (OS). Pupils were equal, round, and reactive with no evidence of relative afferent pupillary defect. Intraocular pressure (mmHg) was normal in both eyes at 14 OD and 15 OS. Visual fields were full to confrontation and extraocular movements were normal in both eyes. Anterior segment examination revealed multiple bilateral corneal deposits that did not stain with fluorescein. Given that her dose of hydroxychloroquine (200 mg twice a day for 0.5 years = 6.5 mg/kg/day) was found to be above the recommended dosage range, a macular optical coherence tomography (OCT) was obtained which did not reveal any evidence of outer retinal layer loss, retinal pigment epithelium drop-out parafoveally, or underlying maculopathy. With regard to her corneal deposits, she was treated with artificial tears and erythromycin ointment at night. She was then referred to a cornea subspecialty clinic by her comprehensive ophthalmologist.

Two weeks later, she was seen at a Massachusetts Eye and Ear Cornea Clinic. On examination, the right eye was found to have a cluster of five subepithelial deposits from 10 to 2 o'clock peripherally (not involving the central visual axis) with intervening subepithelial whitening (Figure 1). In the left eye, examination revealed two subepithelial deposits at 10 and 1 o'clock peripherally (not involving the central visual axis) with an arc of subepithelial whitening connecting these deposits peripherally (Figure 1). The deposits in both eyes were stable in appearance to what was seen on examination at her comprehensive ophthalmology visit. Coarse punctate epithelial erosions consistent with dry eye syndrome were observed inferiorly in the right eye and inferiorly and centrally in the left eye. There was no evidence of corneal neovascularization, corneal thinning, corneal edema, keratic precipitates, dendrites/pseudo-dendrites, or anterior chamber/vitreous cell in both eyes. Dilated fundoscopic examination was normal in both eyes. Given the onset of inflammatory subepithelial deposits without other findings in close proximity to her recent diagnosis of multiple myeloma, it was believed that these deposits were most likely related to her multiple myeloma diagnosis. Since inflammatory deposits from other conditions (e.g., adenovirus, herpes virus, ocular rosacea, and drug-related changes) respond well to topical steroid, it was decided that a trial of topical steroid would be initiated for the patient. The patient was started on loteprednol etabonate 0.5% 1 drop two times daily in both eyes with close follow-up in one month. Although we suspected that the patient's subepithelial deposits were due to her multiple myeloma, we could not confirm this and thus a cautious twice a day dosing regimen of loteprednol was started for the patient.

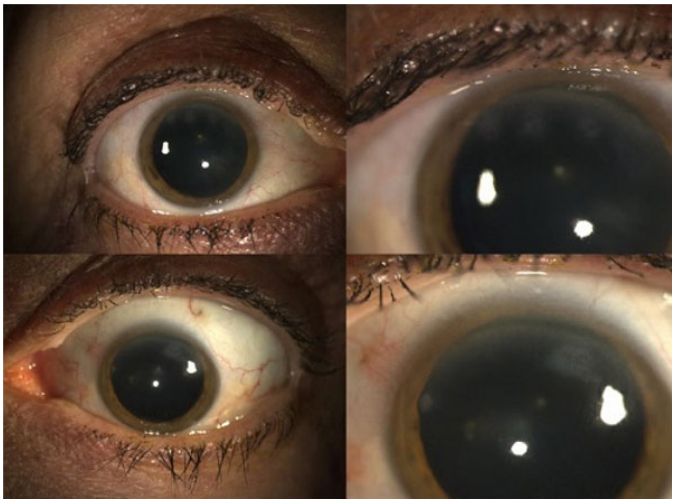

Figure 1: Right eye (top row) and left eye (bottom row) before treatment with topical steroid (irides dilated).

At her one month follow-up visit, the corneal deposits in both eyes had improved with the topical steroid treatment regimen. On examination, the right eye now

showed a cluster of three white subepithelial deposits from 11 to 1 o'clock periphery (most prominent at 12 o'clock periphery) with faded intervening subepithelial whitening (Figure 2). The left eye showed two subepithelial deposits (one at 10 o'clock and another at 1 o'clock) with a faded arc of subepithelial whitening connecting these deposits peripherally (Figure 2). At the one month follow-up visit, the patient's loteprednol 0.5% regimen was slowly tapered (decreased to loteprednol 0.5% one drop nightly in both eyes for two months, then one drop Monday/Wednesday/Friday in both eyes for two months, and then stopped).

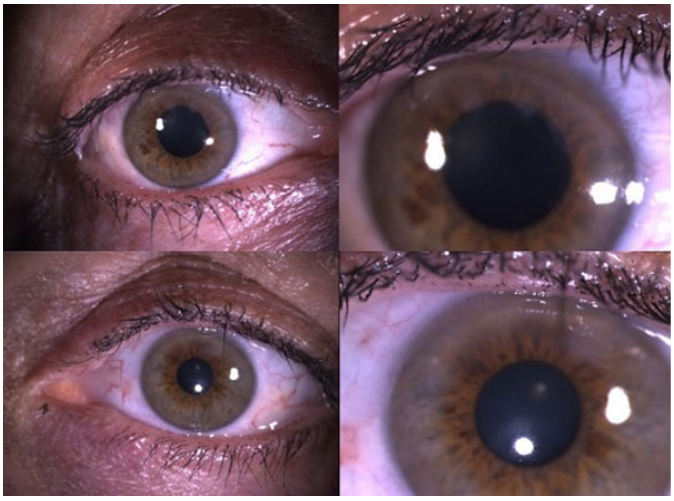

Figure 2: Right eye (top row) and left eye (bottom row) after treatment with topical steroid (irides undilated).

DISCUSSION

In this study, we describe an interesting case in which topical steroid was used and may have contributed toward the treatment of subepithelial corneal deposits most likely due to multiple myeloma. There is growing evidence that multiple myeloma is thought to be, in part, due to some amount of immune dysregulation or sustained immune activation [9]. The extent of immune dysregulation in the ophthalmic manifestation of multiple myeloma is uncertain; however, given the link between immune dysregulation and systemic disease, it is possible that the subepithelial corneal deposits found in our patient were responsive to topical steroid therapy. However, it is also possible that some of the improvement observed in the corneal deposits were in part due to systemic treatment of the patient's multiple myeloma. At the time of her presentation to the Mass Eye and Ear Cornea Clinic, her serum level of free lamda light chains was elevated well past the normal range (5.7–26.3 mg/L) and a consistent downward trend in her serum levels was seen during the period of improvement in her corneal deposits. Twenty-three days before her presentation to Mass Eye and Ear, her serum levels of free lambda light chain were elevated at 32.3 mg/L. Three days after initiation of topical steroid therapy, her serum levels were elevated at 30.4 mg/L. Thirteen days after initiation of topical steroid therapy, her serum levels of light chain dropped to 28.6 mg/L and then 21.1 mg/L around the time of her 1 month follow-up with cornea. No changes were made in her multiple myeloma treatment regimen during the period she was on topical steroids for her corneal deposits. However, given her serologic response to systemic treatment, it is possible that some of her ocular improvement could also have been due to her systemic myeloma treatment. Relatedly, the fact that her corneal deposits improved during a period where her serum light chain concentration also improved provides evidence supporting the conclusion that these deposits were likely a result of her multiple myeloma rather than some other unknown etiology.

It is possible that the onset of intermittent blurred vision in the patient could have been multifactorial. Irregular astigmatism induced by peripheral corneal deposits could have played a role. The presence of dry eye syndrome on the patient's examination and possible transient changes in her refraction due to intermittent episodes of hyperglycemia from her dexamethasone infusions all could have contributed to her blurred vision. Furthermore, the chemotherapy drugs Bortezomib and Lenalidomide in the patient's chemotherapy regimen have also been found to be associated with episodes of blurred vision [10].

It is unclear to what extent topical steroids contribute in the treatment of multiple myeloma-induced corneal deposits, and, if so, what exact duration and potency steroid would be best. In this case, lower potency steroid over the course of months was employed and may have contributed toward minimizing recurrence as can be seen with the treatment of inflammatory deposits from adenovirus and herpes virus. This does not preclude the use of higher potency topical steroid for a shorter duration of time although the numerous side effects of topical steroid need to be weighed when determining a treatment regimen particularly in a patient population that is relatively immunosuppressed and at a higher likelihood of infection [9, 11].

CONCLUSION

Ophthalmic manifestations of multiple myeloma can occur and are most likely to result in corneal crystal or nodular deposition. In this case report, topical steroid was used and may have contributed toward the stabilization and partial regression of peripheral corneal deposits most likely secondary to multiple myeloma. Further research is needed to evaluate various topical steroid strengths and length of treatment for multiple myeloma corneal deposits as well as to disentangle the degree of ocular improvement which can be attributed to topical steroid therapy separate from systemic treatment of the disease.

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Author Contributions

Dennis Akrobetu – Conception of the work, Acquisition of data, Analysis of data, Interpretation of data, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Alice Lorch – Conception of the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Emma Davies – Conception of the work, Design of the work, Interpretation of data, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Guarantor of Submission

The corresponding author is the guarantor of submission.

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Consent Statement

Written informed consent was obtained from the patient for publication of this article.

Conflict of Interest

Authors declare no conflict of interest.

Data Availability

All relevant data are within the paper and its Supporting Information files.