

## Case Study

# Topical steroids, HIV status, CD4 cells and corneal health

### ABSTRACT

A 36 year old patient presented with a history of pain and progressive loss of vision in the right eye which had lasted for 2 months. He was on topical steroids for about one year before presentation with a CD4 cell of 200cells/ $\mu$ L. Examination reviewed a perforated cornea with a huge uveal prolapse. Topical steroids were immediately discontinued and patient placed on topical and systemic antibiotics. Following resolution of the clinical signs, Gunderson's flap was raised to cover the prolapsed uvea. By 6<sup>th</sup> week post-op, a vascularised pseudocornea had covered the exposed uvea resulting in cessation of pain in the eye. Conclusion: Gunderson's flap is viable option for a prolapsed uvea in an immuno-incompetent patient.

**Key words:** Steroids, CD4 cells, HIV, Cornea

18 **INTRODUCTION**

19 Topical steroids are often used to manage many ocular surface conditions.  
20 Unfortunately these drugs are also associated with serious ocular abnormalities,  
21 especially when used injudiciously [1, 2]. A lot has been documented on the propensity  
22 of topical steroids to cause corneal ulceration or perforation but little has been reported  
23 on the results of immune deficiency on corneal health. It appears reduction in number of  
24 CD4 cells makes cornea more susceptible to steroid effects. It also appears immune  
25 deficiency makes cornea succumb to steroid toxicity after shorter period of steroid  
26 treatment than it would in healthy state. The finding in this report might have been  
27 coincidental but its plausibility deserves further scientific scrutiny.

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30 **PRESENTATION OF CASE**

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32 A 36 year old HIV positive driver presented with a history of pain in the right eye that  
33 had lasted for 2 months and a progressive loss of vision. Prior to presentation to our  
34 centre in December 2012, he had presented at another clinic in the previous year where  
35 he was placed on guttae maxidex (dexamethasone), mydriacyl (tropicamide), spersadex  
36 (dexamethasone), ivedexone (dexamethasone), tears naturale, cipromed  
37 (ciprofloxacin), zovirax (acyclovir) eye ointment, hypotears gel, chloramphenicol eye  
38 ointment at various times during the course of the eye problem.

39

40 With deteriorating eye condition he presented to us with 3 empty bottles of  
41 dexamethasone, a bottle of atropine and a bottle of tears naturale. He has been on  
42 topical steroids for about a year. Details of the initial ocular condition could not be  
43 ascertained but he remembered that it was a red painful right eye that took him to the  
44 first primary level eye clinic.

45

46 There was no antecedent trauma, previous eye surgery or use of refractive spectacles.  
47 He is not a known diabetic, asthmatic, hypertensive or sickle-cell patient. He was  
48 diagnosed with HIV infection 10 months before presentation to our facility and has been  
49 on lamivudine, zidovudine and efavirenz. He neither smokes nor takes alcohol. He is  
50 single and attained secondary school education

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52 On examination, vision was light perception (PL) with inaccurate projection on the right  
53 eye. The left eye was essentially normal with a visual acuity of 6/5.

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55 Further reports on examination are those of the right eye. There was a full range of  
56 ocular movements with a diffuse conjunctival hyperemia and muco-purulent discharge.  
57 Cornea was perforated centrally with inferotemporal extension. A huge prolapsing uvea

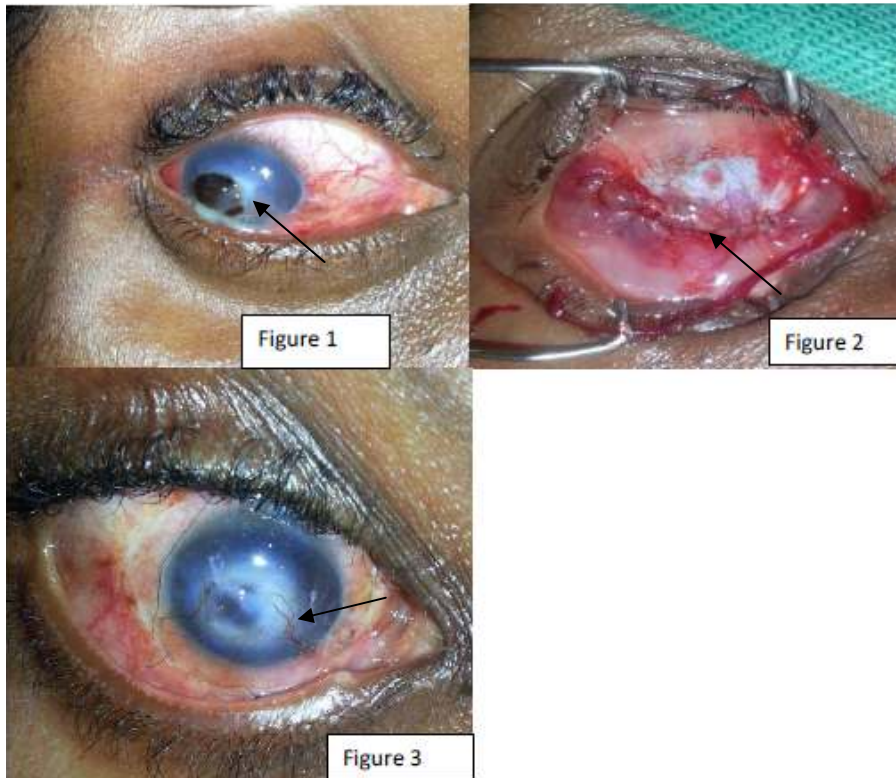
58 tissue from the perforation and descemetocoele precluded further view and a reliable  
59 corneal sensitivity test (figure 1).

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61 Corneal swab was taken for culture on blood agar, chocolate agar, thioglycolate broth  
62 and sabouraud dextrose agar. Culture results were negative. However CD4 cell count,  
63 carried out at a government facility designated for free HIV treatment, was 200 cells/ $\mu$ l.

64  
65 Topical steroids were discontinued and patient placed on guttae atropine, ciprofloxacin  
66 topically and systemically for 1 week. He then had Gunderson's flap raised to cover the  
67 exposed uvea (figure 2). He was seen first day and two weeks postoperatively. He  
68 defaulted till sixth week post-operative period.

69 Examination on the sixth post-operative week showed a vascularised pseudo-cornea  
70 over the prolapsed uvea. (Figure 3)

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74 **Figures 1, 2 and 3** respectively show perforated cornea at presentation with muco-  
75 purulent discharge, Gunderson's flap raised to cover exposed uvea and vascularised  
76 pseudo-cornea 6 weeks post-operatively.

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78 **DISCUSSION**

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80 The deleterious effects of topical steroids on the cornea are well known [1, 2]. However,  
81 there is paucity of report on the combined effects of HIV, levels of CD4 cells and topical  
82 steroids on corneal health. It can be rationally **hypothesized** that HIV and topical  
83 steroids combine immunosuppressive activities to unleash lethal effects on the cornea.  
84 But at what stage in the spectrum of HIV-immunosuppression-AIDS is cornea most  
85 susceptible? Certain ocular conditions have been associated with declining CD4 cells.  
86 The most common ocular complication of HIV infection is a retinal microvasculopathy  
87 called HIV retinopathy. It occurs in 50-70% of patients with CD4 cell counts below 100  
88 cells/ $\mu$ L [3, 4]. Cytomegalovirus retinitis develops in 7.5% to 30% of AIDS patients at  
89 CD4 counts less than 50 cells/ $\mu$ L and Kaposi's sarcoma at less than 200 cells/ $\mu$ L [5]. It  
90 is likely that these ocular complications occur earlier in HIV patients if there are **co-**  
91 **morbidities.**

92

93 The pathogenesis of corneal perforation in our patient is most likely multifactorial. That  
94 the left cornea which had no topical steroid instillations was normal at presentation is  
95 instructive. Could the continued topical steroid instillations on the right eye have  
96 provided the environment for corneal melting at CD4 count of 200 cells/ $\mu$ L? Or at what  
97 CD4 cut-off is cornea most likely to get compromised? Our patient was on anti-  
98 retroviral, could patients not on treatment at same CD4 cell counts have a different  
99 corneal susceptibility? **Further studies are necessary to address some of these**  
100 **questions.**

101

102 Patient being placed on **Acyclovir ointment** suggested that he may have had herpes  
103 simplex keratitis which we could not confirm. In our setting, diagnosis of HSV keratitis is  
104 on clinical ground, often based on a typical dendritic corneal ulceration and loss of  
105 corneal sensation. Some patients present with geographic corneal ulcers following use  
106 of harmful traditional eye medications (HTEMs) and injudicious topical steroid use. CD4  
107 cells are a key component of the adaptive immune system. They act as helper cells  
108 that induce cytotoxic CD8-positive T cell clones and recruit macrophages responsible  
109 for apoptosis of infected cells [6-8]. Where CD4 cells are depleted as seen in HIV  
110 infections, HSV virulence is likely to increase.

111

112 The response of our patient to discontinuation of **frequent** topical steroid drops,  
113 Gunderson's flap, topical and systemic antibiotic was remarkable. Only twice daily  
114 steroid ointment, 2-hourly topical and twice daily tablets 500mg ciprofloxacin were  
115 required to control postoperative inflammation and curtail infection. Since the entire  
116 cornea with the exposed uvea was **covered** with **conjunctiva further corneal melting was**  
117 **unlikely** despite post-operative corneal ointment. Topical steroid was discontinued 2  
118 weeks when post-operative inflammation had subsided significantly.

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120 We therefore advocate a detailed study to find the association between topical steroids  
121 and immunosuppression on corneal health and conclude that evisceration seems no  
122 immediate option for a huge iris prolapse following corneal perforation in a retro-viral  
123 positive patient with depleted CD4 cells.

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#### 125 **CONSENT**

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127 All authors declare that written informed consent was obtained from the patient.

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#### 129 **ETHICAL APPROVAL**

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131 All authors hereby declare that this study has been performed in accordance with the ethical  
132 standards laid down in the 1964 Declaration of Helsinki.

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#### 134 **ACKNOWLEDGEMENTS**

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#### 136 **COMPETING INTEREST**

137 Authors have declared that no competing interests exist.

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