

Case Study**Topical steroids, HIV status, CD4 cells and corneal health- a case report**1  
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18**ABSTRACT**

A 36 year old HIV positive commercial driver presented with a 2 month history of right painful progressive loss of vision. He was on topical steroids for about one year before presentation. 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 infection, Gunderson's flap was raised to cover prolapsed uvea. By 6<sup>th</sup> week post-op, a vascularised pseudocornea had covered the exposed uvea resulting in a quieter eye. Conclusion: Gunderson's flap is viable option for a prolapsed uvea in an immuno-incompetent environment like declining CD4 cells.

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

19 **INTRODUCTION**

20 The anti-inflammatory activities of topical steroids are often explored in many ocular  
21 surface conditions. Unfortunately these drugs are also associated with serious ocular  
22 morbidity, especially when misused [1, 2]. A lot has been documented on the propensity  
23 of topical steroids to cause corneal ulceration or perforation but little has been reported  
24 on the modulating role of corneal innate defense mechanisms. It appears an enabling  
25 milieu like depleted CD4 cells makes cornea more susceptible to steroid effects. It is  
26 likely this synergism makes cornea succumb earlier than it would have in a healthy  
27 state. The finding in this report might have been coincidental but its plausibility deserves  
28 further scientific scrutiny.

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31 **PRESENTATION OF CASE**

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

40

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

46

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

52

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

55

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

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

61  
62 Corneal swap was taking for culture on blood agar, chocolate agar, thioglycolate broth  
63 and sabouraud dextrose agar. Culture results were negative; however CD4 cell counts  
64 when the eye condition started was reportedly 200 cells/ $\mu$ l.

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

70 Examination on the second and sixth week postoperatively showed a quiet eye a  
71 completely covered uvea by a vascularized pseudo-cornea (Figure 3)

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75 **Figures 1, 2 and 3** show Perforated cornea at presentation with muco-purulent  
76 discharge, Gunderson's flap raised to cover exposed uvea and vascularised pseudo-  
77 cornea 6 weeks post-operatively associated with a quiet eye.

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79 **DISCUSSION**

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

93

94 The pathogenesis of corneal perforation in our patient is most likely multifactorial. That  
95 the left cornea which had no topical steroid instillations was normal at presentation is  
96 instructive. Could the continued topical steroid instillations on the right eye have  
97 provided the environment for corneal melting at CD4 count of 200 cells/ $\mu$ l? Or at what  
98 CD4 cut-off is cornea most likely to get compromised? Our patient was on anti-  
99 retroviral. Could patients not on treatment at same CD4 cell counts have a different  
100 corneal susceptibility? A multi-center randomized interventional trial that involves  
101 heterogeneous groups of HIV patients would obviate confounders and address some of  
102 these questions.

103

104 Patient being placed on Zovirax suggested that he may have had herpes simplex  
105 keratitis which we could not confirm. CD4 cells are a key component of the adaptive  
106 immune system. They act as helper cells that induce cytotoxic CD8-positive T cell  
107 clones and recruit macrophages responsible for apoptosis of infected cells [6-8]. Where  
108 CD4 cells are depleted as seen in HIV infections, HSV virulence is likely to increase.

109

110 The response of our patient to discontinuation of topical steroid drops, Gunderson's flap  
111 and frequent topical and systemic antibiotic was remarkable. Only twice daily steroid  
112 ointment, 2-hourly topical and twice daily tablets 500mg ciprofloxacin were required  
113 postoperatively. Since the entire cornea with the exposed uvea was 'clad' in conjunctiva  
114 the thought of further corneal melting with topical steroid was not entertained.

115

116 We therefore advocate a detailed study to find the association between topical steroids  
117 and CD4 cells on corneal health and conclude that evisceration seems no immediate  
118 option for a massive iris prolapse following corneal perforation in retro-viral positive  
119 patient at CD4 count of 200 cells/ $\mu$ l.

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#### **ETHICAL APPROVAL**

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122 All authors hereby declare that this study has been performed in accordance with the ethical  
123 standards laid down in the 1964 Declaration of Helsinki.  
124

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#### 127 **COMPETING INTEREST**

128 Authors have declared that no competing interests exist.

#### 129 **REFERENCES**

- 131
- 132 1. Srinivasan M, Mascarenhas J, Rajaraman R, Ravindran M, Lalitha P, Glidden  
133 DV, et al. Corticosteroids for bacterial keratitis: the Steroids for Corneal Ulcers  
134 Trial (SCUT). *Arch. Ophthalmol.* 2012; 130(2):143-50.
- 135 2. Carmichael TR, Gelfand Y, Welsh NH. Topical steroids in the treatment of central  
136 and paracentral corneal ulcers *Br. J. Ophthalmol.* 1990; 74: 528-31.
- 137 3. Kempen JH, Jabs DA. Ocular complications of human immunodeficiency virus  
138 infection. In: Johnson G, Minassian DC, Weale RA, West SK, editors. *The*  
139 *Epidemiology of Eye Disease*, 2<sup>nd</sup> ed. London. 2003; 318-340.
- 140 4. Jabs DA. Ocular manifestations of HIV infection. *Trans. Am. Ophthalmol. Soc.*  
141 1995; 93:623-83.
- 142 5. Baroud JM, Haley L, Montaner JS, Murphy C, Januszewska M, Schechter MT.  
143 Quantification of the variation due to laboratory and physiologic sources in CD4  
144 lymphocyte counts of clinically stable HIV-infected individuals. *J. Acquir. Immune.*  
145 *Defic. Syndr.* 1995; 10(suppl 2):S67–73.
- 146 6. Mester JC, Rouse BT. The mouse model and understanding immunity to herpes  
147 simplex virus. *Rev. Infect. Dis.* 1991; 13 Suppl 11:S935-S45.
- 148 7. Schmid DS, Rouse BT. The role of T cell immunity in control of herpes simplex  
149 virus. *Curr. Top. Microbiol. Immunol.* 1992; 179:57-74.
- 150 8. Ghiasi H, Cai S, Perng GC, Nesburn AB, Wechsler SL. Both CD4+ and CD8+ T  
151 cells are involved in protection against HSV-1 induced corneal scarring. *Br. J.*  
152 *Ophthalmol.* 2000; 84:408–12.