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(CASE STUDY)

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Acute red eye following the use of steroid eye drops by patients seen at the eye clinic, department of ophthalmology, Chukwuemeka Odumegwu Ojukwu University Teaching Hospital Amaku – Awka, South Eastern Nigeria: Case series

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Abstract

Five cases (one male, four females aged between 32-65 years) of acute painful red eye following application of steroid eye drops have been presented. Their presentation followed a similar trend viz: sudden painful eyes, redness, tearing, photophobia, tenderness, and blepharospasm following topical steroid eye use. There was immediate relief within an hour of instillation of atropine 1% eye drop and full recovery after two weeks of presentation following further treatment with atropine 1% eye drop, tablet paracetamol, chloramphenicol eye drop and flurbiprofen eye drop.

Steroids are important group of drugs that are employed in the management of many medical conditions. When used properly, they bring good results most of the time. Acute red eye was observed in this case series following topical steroid use on the eyes and the patients need to be educated on the proper use of this group of drugs so as to reduce its adverse effects.

Keywords: Acute painful red eye; Sudden onset; Topical steroid eye use

1. Introduction

Steroids, the wonder drugs, have great contributions to ophthalmology. They produce more dramatic effects and save the delicate ocular tissues from structural and functional loss due to inflammation [1]. The corticosteroids act by induction of lipocortins [2]. These lipocotins inhibit phospholipase A_2 causing reduced production of prostaglandins and leukotrienes which results in widespread effects in the cellular and tissue levels giving rise to anti-inflammatory actions [2, 3]. The effects of steroid therapy take place at both cellular and tissue level which includes reduction in capillary permeability, inhibition of degranulation of mast cells, inhibition of edema, decreased fibroblast proliferation, decreased collagen formation, inhibition of histamine and part of complement system synthesis but not limited to them only [1].

Indications for steroid use are legion and range from simple surface disorders like allergic conjunctivitis to certain sight threatening ocular surface and intraocular conditions like mooren's ulcer and iridocyclitis respectively [1, 2]. The contraindications to the use of steroids are equally many and steroid abuse can cause many complications [1, 2, 3, 4, 5].

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Steroids are classified as androgen steroid and corticosteroid. Corticosteroid is available as glucocorticoid and mineralocorticoid. Glucocorticoid has been used as anti-inflammatory medications to treat inflammations not responding to nonsteroidal anti-inflammatory drugs.

The derivatives of a steroid base is important. For example prednisolone comes as acetate, alcohol and sodium phosphate preparations. This simple chemical alteration substantially affects the ability of the drug to penetrate into and through the cornea. Phosphates are soluble in water, so they come in an aqueous form. Acetate and alcohol are sparingly soluble and they are marketed as suspensions. Acetate and alcohol derivatives which are in suspensions penetrate through the intact cornea better than aqueous form because acetate and alcohol derivatives are biphasic [1].

Acetate derivatives are more potent and more effective than phosphate or alcohol derivatives [1]. The acetate derivatives achieve therapeutic superiority over the phosphate derivatives due to the fact that it penetrates better through the cornea thereby reaching higher intra-ocular concentrations. However the reason for this is not fully understood [1]. While the phosphate form is believed to provide sudden but short term effect, the alcohol and acetate forms provide prolonged action [1].

Abrupt stoppage of topical steroid may cause rebound phenomenon [1, 2]. Care has to be taken to reduce steroid eye drops gradually over time to avoid rebound inflammation. Probably, the most important indication for steroid eye drop is anterior uveites to minimize the inflammatory response within the eye and prevent its sequelae that may result in glaucoma, cataract and blindness.

Reduction of plasma cortisol levels has been reported following the use of 0.1% dexamethasone eye drop four times a day for six weeks [6]. Reversible Cushing's syndrome has been reported in an adult and a baby after long-term steroid drop use [7, 8].

2. Case I

A 35 year old mother of three children presented at the ophthalmology clinic of Chukwuemeka Odumegwu Ojukwu University Teaching Hospital Amaku, Awka with history of bilateral painful red eyes of two days duration which was characterized by severe photosensitivity, lacrimation, lid swelling and defective vision. There was no positive history of ocular trauma of any form and no coloured halos were reported. She had no contact with an index case of red eye in the immediate past. She however admitted being on treatment for ocular itching for the past two weeks and the drug she presented was prednisolone acetate suspension eye drop. She reported that she was instructed to use the drop three times a day by the patent medicine dealer, but had not obeyed the instruction strictly.

No positive history of any systemic illness was established. She has not used lens before save the sunshade she then used for photo-protection.

On examination, we found a healthy looking young woman in discomfort. Ocular examination showed blepharospasm, visual acuity of 6/9 both eyes, bilateral lid oedima, lacrimation, photophobia, conjuntival and ciliary injection – but no discharge. The corneae were clear; the anterior chambers were deep while the pupils were small and hardly reactive. There was globe tenderness. Fundoscophy, slit lamp examination and corneae staining with fluorescein dye were uneventful. Attempted intraocular measurement was unsuccessful as the patient was uncooperative.

A diagnosis of bilateral acute anterior unveitis was made. She was put on atropine 1% eye drop stat, and further treatments were as follows: atropine 1% eye drop twice a day for four days; chloramphenicol eye drop four times a day for two weeks; flurbiprofen eye drop three times a day for two weeks and tablet paracetamol 1000 mg three times a day for four days. She was advised to be on sunshade and stop the use of predinsolone acetate suspension eye drop. She was sent for erythrocyte sedimentation rate and white cell count total and differential. Within half hour of atropine instillation she was much relieved and was sent home on her prescribed drugs.

After a week, she came back completely relieved save for the mydriatic and cycloplegic effects of the atropine eye drop but she did not do the tests that were requested – and no reason was given. The visual acuity after two weeks was 6/6 both eyes.

3. Case II

Mrs XX, a sixty-five year old lecturer reported at the Cradle Eye Clinic (a private eye clinic at Akwata Road Awka, Anambra State) on 10th July, 2017. She presented with a two day history of severe bilateral ocular pains, redness, tearing, photosensitivity which was more on the right eye. No positive history of ocular trauma of any form was established and no contact with an index case of red eye in the immediate past was revealed prior to this. She did not admit presence of any systemic disease. However, she has been on topical betamethasone sodium sulphate eye drop which she got from a pharmacy for some days now on both eyes at the rate of three times a day. She stopped using the drop following the onset of painful crisis. She has been using presbyopic lens, but just added sunshade to reduce glare from light source. No coloured halos were reported.

On examination, a healthy looking elderly woman in obvious severe ocular pains was found. Ocular examinations revealed blepharospasm and visual acuity of 6/12 (RE) and 6/9 (LE). Bilateral lid oedema, photophobia, conjuntival and ciliary injection, lacrimation but no discharge. The corneae and anterior chambers were essentially normal. Corneae fluorescein dye stain was negative. The pupils were small and hardly reactive, fundoscopy did not show any abnormality – but the globe was tender. Slit lamp examination showed nothing untoward. Intraocular pressure could not be checked instrumentally due to uncooperativeness of the patient, however digital pressure check did not reveal any raised intra-ocular pressure. Diagnose of bilateral acute anterior uveitis was made. Immediate topical atropine 1% eye drop was started and the patient was observed. Within half an hour she got instant relief. She was sent home on atropine 1% eye drop twice a day for four days, chloramphenicol eye drop four times a day for two weeks, flurbiprofen eye drop three times a day for two weeks and tablet paracetamol 1000 mg three times a day for four days. Sunshade use and stoppage of topical betamethosone eye drop was advised. Erythrocyte Sedimentation Rate (ESR) and white cell (total and differential) were requested. The following days she called on phone to say she was completely relieved save the visual blurrining (atropine effect). She was reassured and reminded to come back a week after, but she never did. She only communicated through phone to register her pleasure.

4. Case III

Mrs VV, a 52 year old civil servant was seen at the ophthalmology clinic of Chukwuemeka Odumegwu Ojukwu University Teaching Hospital Amaku, Awka with complaints of foreign body sensation and itching of the eyes. There was associated ocular redness and lacrimation but no conjunctival discharge. There was no coexisting systemic disease. She was using presbyopic lens. Systemic and ocular examinations were uneventful as the visual acuity of both eyes was 6/6.

The diagnosis of allergic conjunctivitis was made and she was put on Betnesol N eye drop three times a day for one week and tapered thereafter to twice a day for one week and finally once a day. After one week, she got better and stopped the medication altogether. Two days after stopping the medication, she called that she was having severe ocular pains and redness, tearing and unable to look at the light that she preferred staying indoors or in semi-dark places. No history of ocular trauma, no contact with index case of red eye, no coloured halos were reported.

Examination showed a healthy looking woman though in terrible ocular pains. She was on sunshade which helped to mitigate her ocular photosensitivity. Ocular examination showed the visual acuity of 6/9 both eyes. The lids were oedematous, and conjuntival and ciliary injections were noted. There was tearing but no discharge. The corneae, anterior chambers were normal and the cornea did not stain with fluorescein dye. Pupils were small and reacted mildly. Fundoscopy was unremarkable. Slit lamp examination was essentially normal. Intraocular pressure was not measured as the patient was uncooperative.

Diagnosis of bilateral acute anterior uveitis was made. She was put on topical atropine 1% eye drop stat – and within half an hour relief came her way. She was sent home from clinic on atropine 1% eye drop twice a day for four days, chloramphenicol eye drop four times daily for two weeks, flurbiprofen eye drop three times a day for two weeks and tablet paracetamol 1000 mg three times a day for four days to come back in a two weeks time. She did not honour her appointment, but only called on phone to say she was completely healed.

5. Case IV

Miss KK, a 32 year old higher degree student in one of the Nigerian Universities was seen at the ophthalmology clinic of Chukwuemeka Odumegwu Ojukwu University Teaching Hospital Amaku, Awka with complaints of bilateral severe ocular pains, redness, tearing, lid swelling and unable to look out from the confines of her room. As such, she has sought comfort in the use of sunshade. History did not establish positive ocular trauma or any contact with an index case of red

eye but she admitted that she has been on an eye drop for a week and some days prior to the onset of her current ocular problem. The eye drop turned out to be prednisolone acetate suspension which she used on self-medication for ocular itching. She uses cylindrical lens.

Examination showed a healthy looking lady in obvious severe ocular pain and blepharaspasm. Ocular examination showed the visual acuity of 6/9 both eyes. The lids were oedematous, conjunctival and ciliary injection, tearing but there was no discharge however. The corneae and anterior chambers were normal. The corneae did not stain with fluorescein dye. The pupils were round and small but unreactive to light. Fundoscopy did not show any abnormality.

Diagnosis of bilateral acute anterior uveitis was made. She was put on topical atropine 1% eye drop stat at the clinic. She was sent home on atropine 1% eye drop twice a day for four days, chloramphenicol eye drop four times daily for two weeks, flurbiprofen eye drop three times a day for two weeks and tablet paracetamol 1000 mg three times a day for four days. She was advised to use sunshade to mitigate photophobia and to come back in a week time. Before leaving the clinic, she felt better and called the following day to say she was alright – save hazy vision which probably could be due to atropine effect. On the one week appointment, she was completely alright save the residual effects of atropine. In subsequent visits, nothing untoward was noted as all the parameters of ocular function were essentially normal with visual acuity of 6/6 and intraocular pressure of 15 mm/kg respectively.

6. Case V

A 57 year old male trader presented at the eye clinic of Chukwuemeka Odumegwu Ojukwu University Teaching Hospital with two day history of bilateral painful red eyes, lacrimation photosensitivity and swelling of eye lids. No positive history of ocular trauma of any form was established. No contact with an index case of red eye in the immediate past, and no associated ocular discharge. The two eyes were affected at the same time and no coloured halos were reported. He was a hypertensive of 5 years standing but under medical control and has no other systemic illness. Drug history showed that he has been on topical dexamethasone eye drop for the past three weeks at frequency of three times a day. He uses bifocal lens.

On examination, we saw a healthy looking man in severe ocular pains. Ocular examination revealed visual acuity of 6/9 both eyes, swollen lids, blepharospasm, conjunctival and ciliary injection, tearing but no discharge. The corneae were clear and non-staining, normal anterior chambers, round and small pupils but reacts mildly to light. Fundoscopy was unremarkable. Patient was uncooperative with intraocular pressure measurement. Slit lamp examination was uneventful.

Diagnosis of bilateral acute anterior uveitis was made. He was put on instant topical atropine 1% eye drop stat; within 30 minutes, comfort came his way. He was sent home on atropine 1% eye drop twice a day four days, chloramphenicol eye drop four times a day for two weeks, diclofenac sodium eye drop three times a day for two weeks and tablet paracetamol 1000 mg three times a day for four days. He was advised to use sunshade for photoprotection. He called later to say he was better. Two weeks later, he came back to the clinic fully restored and visual acuity was found to be 6/6 both eyes.

7. Discussion

Five cases of acute painful red eyes following topical steroid use have been presented. One male and four females and their age range is 32 – 65 years. Their presentation followed similar trend viz: acute painful red eyes of sudden onset, tearing, intractable photophobia, swelling, without positive history of ocular trauma and no contact with an index case of red eye in the immediate past. Positive response following use of steroid eye drop is another important common denominator in all the five cases. Their desires to seek for medical attention were prompt which pointed to the severity/urgency of the situation. Patients with acute painful conditions tend to show earlier presentation and better compliance to treatment [9] unlike in insidious and asymptomatic cases [10, 11].

The importance of ocular steroids in ophthalmology cannot be overstated. For many decades, nothing has matched their effectiveness as fast acting anti-inflammatory agent [12]. If they did not have adverse effects, steroid would be the only anti-inflammatory agents we would ever need. However, ocular steroids though relatively inexpensive and potent but show considerable adverse effect like cataract, glaucoma, secondary infection and delayed healing [13, 14].

Few literatures have reported acute anterior uveitis as observation following topical steroid eye use [15, 16, 17]. The reason is not known.

In this case series, all the cases presented with features typical of acute inflammatory conditions characterized by pains (dolor), redness (rubor), swelling (tumor), heat (calor) and loss of function (function laesia) [18]. The loss of function in these cases is typified by the patients' inability to use the eye like before the onset of the painful crisis. These cases exhibited some features of intraocular inflammation typical of acute anterior uveitis [19, 20].

Relief came the way of these patients within an hour of instillation of 1% atropine eye drop. This may be due to cycloplegic effect of atropine which ultimately relieves ciliary spasm, an important feature of acute anterior uveitis.[19] Atropine is also known to exhibit some anti-inflammatory properties. None steroidal anti-inflammatory agents were employed while stopping the topical steroid. Abrupt stoppage of steroid eye drops in these patients may have caused the acute painful ocular condition through rebound phenomenon [1, 2]. The sudden withdrawal of the steroid eye drop may have led to rebound vascular permeability as well as ciliary and pupillary spasms. The use of 1% atropine eye drop on these patients may have brought relief to them by its pupillary dilation, reduction in iris vessel permeability and outright stoppage of papillary muscle spasm thereby ameliorating the photophobia [21]. Some authors have reported adverse effects of steroid eye drops to include cataract, glaucoma, secondary bacterial infections and delayed healing[13, 14], but none mentioned acute anterior uveitis.

The topical steroids used by most of the patients in this case series were acetate derivatives which have been noted to have higher potency compared to aqueous forms. Acetate and alcohol derivatives which are in suspension form penetrate through the intact cornea better than aqueous form because, acetate and alcohol derivatives are biphasic [1]. This simple chemical alteration substantially enhances the ability of the drug to penetrate through the intact cornea thereby limiting the concentration of the drug in the cornea [1]. Acetate derivatives therefore achieve therapeutic superiority in spite of the fact that its concentration in the cornea is less. The reason for this is obscure and therefore needs to be explored.

With steroid therapy, suppression of inflammation is needed until the pathologic mechanism burns out hence the need to taper the dose gradually before stopping. The gradual withdrawal of steroid as against abrupt stoppage will help to reduce the incidence of its adverse effects including intraocular inflammation (anterior uveitis). However, immune related uveitis is reported to be of the commonest occurrence in clinical practice [22] and steroid being an immuno regulator may be the cause of acute red eye with resemblance of uveitis. Also addition of preservative may be associated with ocular irritation, allergies and disruption of ocular surfaces [23]. Furthermore, the eye drops used by these patients are not antibiotics based and so may be more vulnerable to contamination. On repeated applications, these eye drops are more liable to cause infection with consequent anterior uveitis[24]. Patients who are susceptible to reactions may benefit from preservative free eye drops [25].

8. Conclusion

Steroids are important group of drugs used to treat many medical conditions. They have wide range of actions including anti-inflammatory properties. It can be given both systemically and topically. Like many other drugs, it has its own adverse effects especially when inappropriately dispensed. In the present case series, acute red eyes were observed among the patients following topical applications. And these patients were observed to use the topical steroid eyes drops inappropriately (i.e. they did not tapper the doses during the course of the therapy. Atropine eye drop which is a known cycloplegic, mydriadic, with some anti-inflammatory properties was observed to give relief to these patients when put to use. Patients should be educated on the need to tapper the doses during the course of steroid therapy. However, further experimental studies need to be carried out to ascertain if the condition (acute red eye) is part of immune regulatory properties of the steroid drugs with semblance of acute anterior uveitis.

Compliance with ethical standards

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Disclosure of conflict of interest

There was no conflict of interest to be declared.

Statement of informed consent

Informed consent was obtained from all the subjects who were involved in this case series.

References

[1] Rathinam S. Corticosteroids in Ocular Disorders. In: Aravind Eye Hospital Staff (ed). Ocular Pharmacology and Therapeutics. Madurai, India. Aravind Eye Hospital and Postgraduate Institute of Pharmacology. 1992; 57-62.

[2] Kamna V, Alok KR, Shuchita J. Steroidal Anti-inflammatory Agents. In: Biswas NR, Gupta V, Dubey A (ed). Ocular Therapeutics. 3rd ed. New Delhi: CBS Publisher and Distributors Pvt Ltd. 2011; 59-70.

[3] Omoti AE. Basic Ocular Pharmacology. In: Nwosu SNN, Chuka-Okosa CM, Babalola OE, Mpyet C, Edith AD (ed). Essentials of Ophthalmology in the Tropics for Midical Students, Residents General Ophthalmologists and General Practitioners. 1st ed. Enugu: Ezu Books Ltd. 2015; 79-116.

[4] Kanski JJ. Disorders of Lens. In: Kanski JJ, ed. Clinical Ophthalmology; A Systematic Approach 3rd ed. Glasgow: Butterworth Heinemann. 2005; 285-309.

[5] Khurana AK. Diseases of the Lens. In: Khurana AK, ed. Comprehensive Ophthalmology 5th ed. New Delhi: New Age International Ltd. 2012; 177-216.

[6] Krupin T, Mandel A, Podos SM, Becker B. Topical Corticosteroid Therapy and Pituitary-Adrenal Function. Arch. Ophthal. 1976; 94(6): 919-20.

[7] Afandi B, Toumeh MS, Saadi HF, EndoorPract. 2003; 9: 526-9.

[8] Scherrer KS, Weitz M, Eisenack J, Truffor B, Konrad D. Cushing Syndrome after bilateral lensectomy. Eur J Pediatr. 2015; 174(3):399-401.

[9] Ochiogu BC, Udeaja AC, Ughachukwu PO. Compliance of Patients to some Topical Eye Medications used in Ophthalmology Department of Anambra State University Teaching Hospital Awka, South Eastern Nigeria. Tropical Journal of Medical and Health Sciences Research. 2014, 3(1): 37-46.

[10] Schwartz GF. Compliance and Persistency in Glaucoma Follow up Treatment. Curr. OpinOphthalmol. 2005; 16(2): 114-121.

[11] Noe L, Sneeringer R, Patel B, Williamson T. The Implications of Poor Medication Persistence with Treatment for Overactive Bladder Manag Care. Interface. 2004; 17(11): 54-60.

[12] Abelson MB, Butrus S. Corticosteroid in Ophthalmic Practice. In: Albert DM, Azar DB. eds. Albert and Jakobiec's Principles and Practice of Ophthalmology 3rd ed. Philadelphia: Saunders Elsevier. 2008.

[13] Flach AJ, CutanOculToxicol. 1991; 10(4): 253-277.

[14] Duvall B, Kershnor R. Ophthalmic Medications and Pharmacology, 2nd ed. Thorofare N.J Slack. 2006.

[15] Product Information. Omnipred. Predmsolone Ophthalmic, Alcon Laboratories Inc, Fort Worth TX.

[16] Product Information. Pred Mild. Predmsolone Ophthalmic, Allergan Inc. Irvine CA.

[17] Product Information. Predmsolone Sodium Phosphate Ophthalmic, Bausch and Lomb, Rochester NY.

[18] Dorland's Illustrated Medical Dictionary 29th ed. Philadelphia: W.B Saunders Company. 2000.

[19] Okosa C, Oguego N, Ogbonnaya C. Intraocular Inflammation, Uveitis and Endopthalmitis. In: Nwosu SNN, Chika Okosa CM, Babalola OE, Mpyet C, Edith AD (ed). Essentials of Ophthalmology in the Tropics for Medical Students, Residents, General Ophthalmologists and General Practitioners. Enugu; Ezu Books Ltd. 2015; 231-255.

[20] Khurana AK. Diseases of the Uveal Tract; In Comprehensive Ophthalmology, 5th ed. New Delhi: New Age International Publisher Ltd. 2012; 143-176.

[21] Evans NM. Inflammatory Eye Diseases. In: Ophthalmology, 2nd ed. New York; Oxford University Press Inc. 1995; 113-125.

[22] Khurana AK. Diseases of the Uveal tract. In: Khurana AK ed. Comprehensive ophthalmology 5th ed. New Delhi: New Age International Ltd. 2012; 141–176.

[23] Pisella PJ, Pouliquen P, Baudouin C. Prevalence of Ocular Symptoms and Signs with Preserved and Preservative free Glaucoma Medications. Br J. Ophthalmol. 2002; 86: 418-423.

[24] Ochiogu BC, Udeaja AC, Ughachukwu PO, Okani C. Bacterial contamination of eye drops in multiple application bottles at Chukwuemeka Odumegwu Ojukwu University Teaching Hospital, Amaku Awka, Anambra State, Nigeria. J. Chem. Bio. Phy. Sc. Sec, B. February 2017 – April 2017; 7(2): 434-442.

[25] Rahman MQ, Tejwani D, Witson JA, Butcher I, Ramaesh K. Microbial Contamination of Preservative free Eye Drops in Multiple Application Containers. Br J. Opthalmol. 2006; 90(2): 139-141.