

Topical corticosteroid drops in the management of dry eye

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Abstract

Purpose:

To evaluate the efficacy and safety of topical corticosteroid drops for treatment of moderate to severe dry eye cases.

Methods:

Fifty eyes of 25 dry eye patients, who were unresponsive to artificial tears only, were treated with 0.1% fluorometholone eye drops for one week. Subjective symptoms scoring, evaluation of conjunctival hyperemia, tears break-up time (BUT), vital staining scores, and Schirmer test I were performed before starting steroid drops and at 1 week and 1 month after treatment.

Results:

All the patients had fewer symptoms as early as one week after topical steroid drops use. Objective tests were improved in all dry eye patients 1 month after treatment, and the difference was significant. Hyperemia of the conjunctiva was relieved obviously one month after treatment ($P<0.05$). The mean value of BUT increased from (5.13 ± 1.82 sec.) before treatment to (6.57 ± 1.85 sec.) at one month. The mean value of Schirmer test I was (4.63 ± 0.94) mm/5 min. increased to (7.12 ± 1.83) mm/5 min one month after topical steroid drops use ($P<0.05$). No complications were observed.

Conclusion:

Short course of topical corticosteroid drops can rapidly and effectively relieve the symptoms and signs of moderate or severe dry eye.

Key words:

Steroid drops and dry eye.

Introduction:

Dry eye syndrome (DES) is one of the most frequently occurring ophthalmological health problems worldwide. The prevalence of dry eye is estimated to be in the range of 5% to 35% and its incidence has recently been increasing. (1) DES is a multifactorial disease of the tears and ocular surface characterized by a deficiency in the quantity or quality of tears, an unstable tear film, ocular surface damage, and bothersome symptoms such as ocular irritation, dryness, fatigue, and fluctuating visual disturbances (2).

Conventional treatment of dry eyes consists mainly of the use of preservative-free artificial eye drops. None of the

commercially available artificial tear preparations include essential tear components such as epidermal growth factor, hepatocyte growth factor, fibronectin, neurotrophic growth factor, and vitamin A, all of which have been shown to play an important role in the maintenance of ocular surface epithelial milieu. (3) Long-term application of artificial tears is not effective for some patients, especially those with severe symptoms. (4)

Other treatment modalities for DES include: Punctal occlusion, (5) anti-inflammatory medications such as corticosteroids or cyclosporine, (6) and acupuncture. (7)

It has been confirmed that dry eye is related to an inflammation of ocular surface based on immune response and induced by many cytokines. (8, 9) Corticosteroid is an effective anti-inflammatory drug widely used to control eye inflammation.

In this study, we evaluated the efficacy and safety of using topical corticosteroids drops for management of cases with moderate to severe dry eye.

Patients and Methods:

Cases:

A prospective non-randomized observational study was performed between May 2008 and June 2009. Fifty eyes (of 25 patients) with moderate to severe dry eye received topical steroid drops in the form of 0.1% fluometholone (FML Allergan Inc.). One drop was put into the eye each time, 4 times a day for seven days. Nine patients (18 eyes) were male and 16 patients (32 eyes) were female. The mean age was 39.65 ± 6.63 (years \pm SD) (range: 23 to 56). Criteria used for the diagnosis of dry eye included: presence of fluorescein staining of the cornea in areas where the epithelium has been disrupted, break-up time (BUT) less than 10 seconds and Schirmer test I showing less than 5 mm strip wetting. The baseline demographics of the patients are listed in Table 1.

Methods:

1. Questionnaire was used in these patients before starting treatment and repeated 1 week, 1 month later. The main symptoms included ocular irritation, grittiness, burning, foreign body sensation, photophobia, and fluctuation of vision with blink.

The following method was used to score cases:

0 score: no symptom; 1 score: less than 3 times a week, relieved after rest; 2~4 scores: between 1 and 5 scores; 5 scores: occur frequently, affect daily activities, relieved after drug use; 6~8 scores: between

5 and 9 scores; 9 scores: occur continuously, affect daily activities seriously, relieved only after drug use.

2. Hyperemia of conjunctiva was evaluated according to slit-lamp scoring as follows:

0 score: no hyperemia of conjunctiva; 1 score: mild hyperemia of conjunctiva; 2 scores: moderate hyperemia of conjunctiva; 3 scores: severe hyperemia of conjunctiva.

3. Break-up time (BUT):

A strip of fluorescein is applied in the lower eyelid fornix and then removed. The patient is asked to blink three times and then look straight forward, without blinking. The tear film is observed under cobalt-blue filtered light of slit-lamp microscope and the time that elapsed between the last blink and appearance of the first break in the tear film is recorded with a stopwatch (a break is seen as a dark spot in a sea of blue).

4. Cornea fluorescein staining inspection:

The cornea was divided into 4 quadrants: supero-nasal, infro-nasal, supero-temporal and infero-temporal quadrant. In each quadrant, the degree of corneal fluorescein staining can be scored into 4 levels.

0 score: negative staining; 1 score: pointed staining, less than 5 points; 2 scores: pointed staining, more than 5 points; 3 scores: filament staining or piece staining.

So the total score of the corneal fluorescein staining is from 0 to 12.

5. Tear secretion test (Schirmer test I):

Topical anesthetic was applied, a Whitman filter paper strip was placed in the lower conjunctival sac and the measurement in millimeters, as the strip was wetted for 5 minutes, was recorded.

6. Intraocular pressure (IOP) measurement using Goldmann applanation tonometer.

All patients received topical steroid drops in the form of 0.1% fluometholone (FML Allergan Inc.) one drop each time, 4 times a day for one week in addition to the artificial tears they were already using; Artelac (Iris Healthcare Ltd.).

Tear film BUT, fluorescein staining of the ocular surface, Schirmer test I results and pain symptom scores were compared before and one week and one month after treatment. According to the study protocol, tear film BUT analysis was performed initially, followed by studying the fluorescein staining of the ocular surface. The Schirmer test I was then performed.

Statistical analysis:

All data in our study were analyzed with SPSS 10.0 software (SPSS Inc.). The Mann-Whitney *U* test was performed for the comparison of vital staining scores, BUT, and subjective symptoms score differences between before and after treatment. A *P* value less than 0.05 was considered statistically significant.

Results:

After the additional application of corticosteroid eye drops to patients who were already using artificial tears, all the patients had fewer symptoms as early as one week later. The average value of the symptom score was (7.15±2.31) before treatment, (4.23±1.41) one week after treatment (*P*<0.05), and (3.65±0.73) one month after treatment (*P*<0.05).

Hyperemia of conjunctiva was relieved obviously one month after the treatment (*P*<0.05). The mean value of BUT before treatment was (5.13±1.82 sec.). One month after treatment BUT was (6.57±1.85 sec.) (*P*<0.05). The mean value of cornea fluorescein staining was (4.76±2.03) before treatment and (2.14±0.91) one month after treatment (*P*<0.05). The mean value of Schirmer test I was (4.63±0.94) mm/(5 min) before treatment and (7.12±1.83) mm/(5 min) one month after treatment (*P*<0.05).

The mean value of intraocular pressure was (14.11±2.79) mmHg before treatment, (14.15±2.91) mmHg one month after treatment. There was no statistically significant difference between pre and post-treatment IOP (*P*>0.05).

The clinical data for all patients before and one week and one month after topical corticosteroid eye drops use are summarized in table 2.

Discussion:

Dry eye is the second most common problem of patients seeking eye care, and is characterized by eye irritation symptoms, blurred and fluctuating vision, tear film instability, increased tear osmolarity and ocular surface epithelial disease. (10, 11) It is often a challenging clinical problem to identify because of its varying clinical presentation. Dry eye impacts quality of life by decreasing functional vision, i.e. the ability to perform daily activities such as reading, using a computer and driving. (12) The etiology of dry eye is very complicated; tear film and ocular surface structures are interdependent on each other. Specifically, the cornea, conjunctiva, Meibomian glands, Goblet cells and lacrimal glands are intricately linked to one another via neural, hormonal and chemical feedback mechanisms.

There is an increasing evidence that dry eye is an inflammatory disease. Disease or dysfunction of the tear secretory glands leads to changes in tear composition, such as hyperosmolarity that stimulate the production of inflammatory mediators on the ocular surface. (13) Inflammation may in turn cause dysfunction or disappearance of cells responsible for tear secretion or retention. (14) Inflammation can also be initiated by chronic irritative stress (e.g. contact lenses) and systemic inflammatory/autoimmune disease (e.g. rheumatoid arthritis). Regardless of the initiating cause, a vicious cycle of inflammation may develop on the ocular surface in dry eye that leads to ocular surface disease.

Artificial tears and punctual occlusion are often used in clinic without treatment of potential etiological factors.

In recent studies, topical corticosteroids have shown promising results for treating dry eye. Steroids may help increase goblet cell density and reduce the accumulation of inflammatory cells within ocular surface

tissues (15, 16). Lee et al., (17) and others reported ocular surface nerve growth factor (NGF) may play an important role in ocular surface inflammation processes associated with dry eye. Keratoconjunctivitis sicca patients showed elevated levels of tear NGF, which were decreased by treatment with 0.1% prednisolone.

In this study, corticosteroid could rapidly ameliorate the subjective symptoms among the patients with moderate or severe dry eye while no obvious effects were observed when using artificial tears only. It can significantly decrease the patient's complaints within one week. Meanwhile, all detected indexes such as cornea fluorescein staining, BUT, tear secretion test and so on were obviously improved one month after corticosteroid treatment.

All of these results suggested that rapid anti-inflammatory activity with high-performance of corticosteroid is very effective for patients with moderate or severe dry eye, which also provide evidence that non-specific immune inflammation is involved in the development of dry eye. Corticosteroid can ameliorate the symptoms and signs rapidly, however, prolonged use of corticosteroid have been associated with increased infection, IOP elevation, and cataract formation. In our study, IOP increase and hormone-related complications did not occur suggesting that the application of topical corticosteroid for short-term was safe. Steroids that are less penetrating to the intraocular structures can minimize hormone-related complications.

Cornea fluorescein staining was improved significantly in our study after corticosteroid treatment as early as the first week. Decreasing cornea fluorescein staining is probably due to the suppression of inflammation enabling normal function of ocular surface.

With the deterioration of dry eye, there can be some filament and piece staining in the cornea. It has been confirmed in many clinical and elementary experiments that the inflammatory factors and the marks concerned are diminished after anti-inflammatory treatment, but the density of conjunctiva goblet cell is increased (15).

The inflammatory factors are decreased and the integrity of ocular surface is improved after the application of corticosteroid, so the nerves of cornea and conjunctiva can be stimulated by blinking more effectively, the reflective secretion becomes normal, then the quality and quantity of tears are also improved, which supports the improved results of lacrimal gland secretion test in our study.

We also found that some patient's vision were improved when the inflammation of ocular surface was relieved, which was mainly resulted from the diminishing of cornea fluorescein staining, the improvement of cornea clearing and the increased stability of lacrimal film. In this study, slow elongation of BUT was observed after the application of corticosteroid and significant good effect was observed one month after treatment.

Conclusion:

Short term use of topical corticosteroid as an anti-inflammatory drug, can rapidly and effectively relieve the symptoms and signs of moderate or severe dry eye.

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Table 1

Baseline demographics of the study cases:

Variable	Value
Number of patients	25
Age (year)	
Mean	39.65 (SD = 6.63)
Median	40
Sex	
Male	9
Female	16
Diagnosis	
Idiopathic DES*	17 (68%)
Rheumatoid arthritis	0
LASIK precipitated	8(32%)
Sjögren syndrome	0
Other	0

* DES: Dry eye syndrome

Table 2

Efficacy of using topical corticosteroids for management dry eye after one week and one month:

Clinical examination	Before steroid	One week later		One month later	
	treatment	Value	P value	Value	P value
Symptom (score)	7.15±2.31	4.23±1.41	<0.05	3.65±0.73	<0.05
Hyperemia of conjunctiva (score)	2.42±0.75	1.86±0.50	>0.05	1.05±0.29	<0.05
BUT (s)*	5.13±1.82	5.93±1.69	<0.05	6.57±1.85	<0.05
Cornea fluorescein staining (score)	4.76±2.03	4.24±1.73	>0.05	2.14±0.91	<0.05
Schirmer test I (mm/5 min)	4.63±0.94	6.55±1.78	>0.05	7.12±1.83	<0.05
IOP* (mmHg)	14.11±2.79	14.15±2.91	>0.05	13.92±2.85	>0.05

*BUT (s): Break up time (seconds)

*IOP: Intraocular pressure

إستخدام قطرة الكورتيكوستيرويد الموضعي في علاج جفاف العين

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قسم طب العيون في كلية الطب ، جامعة الأزهر ، القاهرة ، مصر.

غرض :

لتقييم فعالية وسلامة استخدام قطرات كورتيكوستيرويد الموضعي لعلاج الحالات المتوسطة والشديدة لجفاف العين.

النتائج:

استجابة جميع المرضى للعلاج بعد الاسبوع واحد فقط لاستخدام القطرات .

مع تحسن فى الاختبارات التى أجريت لهم بعد ذلك ومنها اختبارات schirmer

الخلاصة :

ويمكن بطبيعة الحال بعد استخدام قطرات كورتيكوستيرويد لفترة قصيرة معالجة مشكلة جفاف العين وعلى نحو فعال لعلاج جفاف العين المتوسط والشديد