

USING OF CORTICOSTEROIDS IN SMALL ANIMALS OPHTHALMOLOGY

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WYKORZYSTANIE KORTYKOSTEROIDÓW W OKULISTYCE MAŁYCH ZWIERZĄT

Kortykosteroidy w okulistyce wykorzystywane są od ponad pięćdziesięciu lat. Często są jedynym i wskazanym lekiem w leczeniu ostrych zapaleń w obrębie gałki ocznej. Niestety, oprócz szeregu korzystnych efektów leczniczych często powodują skutki uboczne. Zastosowanie steroidów w okulistyce małych zwierząt musi być przemyślane co do zasadności ich użycia. Przede wszystkim rozważyć należy długość terapii i dawkę jaką zastosujemy w danej jednostce chorobowej.

Słowa kluczowe: kortykosteroidy, gałka oczna, zapalenie błony naczyniowej, zapalenie twardówki i nadtwardówki, transplantacja rogówki.

Keys words: corticosteroids, ocular globe, uveitis, scleritis and episcleritis, corneal transplantation.

Introduction

Corticosteroids are, even 50 years after introduction in ophthalmology, the best, and often only choice of treatment for acute inflammatory eye disorders. Their broad spectrum of actions may not only explain the greater potency compared with other anti-inflammatory agents but also be responsible for multiple serious side effects. For future developments, several directions may be chosen including development of safer drugs with high therapeutic index and application of long-term drug-release systems.

Apart from their effect in reducing wound scarring, their major use is in the suppression of inflammation. It was very quickly realized that corticosteroids had little effect on the cause of inflammatory reactions, and that if they were withdrawn in the continuing presence of the exciting stimulus, then the inflammation would again be manifest. Although we now know that

corticosteroids are immunosuppressant in higher doses we are still largely ignorant of their mode of action in inflammatory disease (1,2,5).

The complications of therapy are directly related to the dosage and duration of treatment, and so the most satisfactory results are to be expected where the disease is self-limiting, and where possible potentiating effects on the underlying cause can be counteracted by specific therapy. In ophthalmology there are many situations where these ideals do not obtain. Those of us who see a lot of chronic inflammatory eye disease are no less aware than specialists in other fields of the severe and often unacceptable side effects of these agents (2,3).

The actions of corticosteroids on ocular tissue have been widely studied. In experimental corneal wounds cortisone has been shown to inhibit the formation of the fibrinous coagulum, cellular infiltration, fibroblastic repair and endothelial regeneration completely with large enough doses. Cortisone, given locally or systemically, reduced the increased permeability in ocular capillaries in inflammation, and confirmed findings that there was no effect on the permeability of normal vessels (3,4).

Tissue effects and penetration of corticosteroids

Dexamethasone, bethasone, prednisolone, prednisone, triamcinolone, fluorometholone, hydrocortisone are commonly used in ophthalmic therapy. The effect of corticosteroids on inflammatory mediators account for their actions on the vascular and cellular manifestation of the inflammatory process. In acute inflammation, they decrease vasodilatation, and reduce capillary permeability, which result in less hyperaemia and fluid exudation. In cases of uveitis they reduce iris hyperaemia and inhibit passage of proteins and leukocytes into aqueous humor. Corticosteroids also inhibit the growth of limbal blood vascular cells that are involved in corneal neovascularisation, they also suppress the later stages of inflammatory by inhibiting formation of fibroblasts and their collagen – forming activity as well as by reducing postinflammatory neovascularization.

There are some factors which affecting the penetration effect of corticosteroids:

- acetates are more lipid soluble and penetrate cornea better than succinate and phosphates
- more frequent application results higher intraocular level
- low concentrations of a highly potent steroid may have a lesser anti-inflammatory effect than a high concentration of a less – potent steroid (topical 1% prednisolone has an anti-inflammatory effect similar to that of 0,1 % dexamethasone)
- the route of administration is chosen in relation to the site; corneal and conjunctival conditions are usually treated topically and subconjunctivaly, the same administration is also indicated for disorders of the iris and anterior uveal tract. Systemic corticosteroids are indicated in cases of posterior uveitis. Retrobulbar and systemic application of corticosteroids are used for the treatment of choroid, optic nerve and orbit (6,7,10).

In veterinary ophthalmology for most of superficial disorders 1 % prednisolone or 0,1 % dexamethasone is adequate. For long – term inhibition of less serious inflammation , like allergic conjunctivitis is 0,5 % hydrocortisone suitable.

Indications for corticosteroids usage

Corticosteroids are indicated in various nonpyogenic inflammatory disorders of the

- adnexa
- and globe.

0,1 % dexamethasone sodium phosphate or 0,1 % bethasone sodium phosphate are poorly absorbed by the cornea and have an antiinflammatory effect for the treatment of superficial ocular inflammations :

- blepharitis
- conjunctivitis



Phot. 1. Scleritis and episcleritis.

- episcleritis
- non-infectious/nonulcerative keratitis

1% prednisolone acetate or 0,1 % dexamethasone alcohol are preferred for treating of:

- anterior uveitis



Phot. 2. Uveitis.

The clinical efficacy of topical administration of corticosteroids is improved by adjusting the frequency of application - to the **severity of the inflammation**. Severe inflammation require hourly treatment; the dose is then slowly decreased based on the clinical improvement (3,8,9,10).

Subconjunctival injection of corticosteroids

Subconjunctival route of the administration of corticosteroids is used to control certain forms of noninfectious keratoconjunctivitis, anterior episcleritis or scleritis, and anterior uveitis.

Technique

Most patients can be injected without general anesthesia or sedation. A topical anesthetic is necessary. It is important to restrain the dog or cat. The injection is given under the bulbar conjunctiva. It is important that the injection be placed as close to the lesion as practical because this increases effectiveness. For example, in pannus the lesion usually is most prominent ventrolaterally and the injection should be directed there.

A 25 or 27 gauge needle is used. In small animal the maximal amount of 0,5 ml is injected.

Based on their estimated duration of action, long – acting corticosteroids may be repeated 2 or 3 weeks apart by this route of administration.

One potential problem with the subconjunctival administration of repository corticosteroids is that a granuloma may develop at the injection site and may require surgical excision (3,6).

Systemic administration of corticosteroids

Systemic application of corticosteroids may be combined with topical or subconjunctival therapy for treatment for severe or refractory anterior uveitis or used alone for the control of chorioretinitis, optic neuritis, or non-infectious orbital inflammation. Parenteral corticosteroids are currently combined with nonsteroidal anti-inflammatory agents in cases of severe uveitis.

Corticosteroids and their **general indications**:

1. immune mediated ocular disorders (allergic conjunctivitis, drug and contact allergy, lens – induced uveitis, and chronic immune – mediated keratokonjunctivitis syndrome)



Phot. 3. Lens induced uveitis.

2. traumatic condition resulting in severe inflammation (prolaps of globe, globe contusion and hyphema)
3. nonpyogenic inflammation (episcleritis)
4. postoperative immunosuppression (corneal transplantation, cataract extraction)
5. reduction of neovascularisation and scarring in the cornea (only in fluorescein negative testing)
6. reduction of postoperative swelling and inflammation after cryosurgery

Specific indication for corticosteroids usage:

1. seasonal allergic blpharitis and conjunctivitis
2. canine allergic inhalant dermatitis syndrome (atopy)
3. staphylococcal blpharitis with hypersensitivity
4. reduction of corneal scar formation
5. reduction of corneal neovascularisation and vascularisation
6. chronic immune - mediated keratoconjunctivitis syndrome (in German shepherd breed; chronic superficial keratitis – brachycephalic breeds)



Phot.4. Plasma cell infiltration.

7. chorioretinitis and retinitis
8. generalized histiocytoma
9. immune reaction on keratoplasty
10. lens – induced uveitis
11. malignant lymphoma



Phot. 5. Malignant lymphoma.

12. optic neuritis
13. proliferative conjunctivitis syndrome in collies
14. scleritis and episcleritis
15. serous retinal detachment
16. traumatic proptosis of the globe
17. uveitis, nonsuppurative, and traumatic
18. uveodermatologic syndrome

Side effects of corticosteroids

Corticosteroids decrease leukocyte movement from vessels to the site of the infection and depress macrophage phagocytosis of microbe. This may result from changes in the number of receptors on their cell membranes and from a decreased activation of macrophages by lymphokines and nitric oxide synthase. As a result, corticosteroid can potentially activate or exacerbate ocular bacterial, viral, or fungal infections.

Glaucoma, posterior subcapsular cataract, mydriasis, and calcific band keratopathy are clinically significant ocular complications of the topical ocular corticosteroids therapy in humans. An increase IOP, or another complications after long – term corticosteroid treatment were not observed in veterinary ophthalmology (7,6,10).

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