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CORNEAL AND UVEAL TRACT PATHOLOGY IN DOMESTIC CARNIVORES

DOCTORAL THESIS

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ABSTRACT

The PhD thesis entitled ***Corneal and uveal tract pathology in domestic carnivores*** is structured according to current legal standards, into two main parts: part I *Current state of knowledge regarding the pathology of the cornea and the uveal tract in domestic carnivores*, which contains 66 pages and represents 28,7% and part II *Personal contributions*, 164 pages long, representing 71,3%.

The first part, structured into 2 chapters, briefly presents information from specialized literature referring to the subject, syntheses which were subsequently used for interpreting and comparing the data obtained in part two. This part is illustrated with 16 figures and 1 table, which were considered suggestive for detailing the synthesized information.

The second part is structured into 4 chapters (chapters III – VI): purpose and research objectives, material and methods, results and their interpretation. The final conclusions put an end to this part.

The research was undertaken over a period of 4 years, October 2007 - September 2011, on a number of cases offered by the Surgical Clinic at the Faculty of Veterinary Medicine, Iasi, as well as by the Centre Hospitalier Universitaire Vétérinaire Alfort – Ecole Nationale Vétérinaire Alfort (CHUVA-ENVA), Maisons-Alfort, France, during March-April 2010, and also by the Centrovet Clinic in Bucharest.

The main objectives of the thesis presented in chapter III were:

- establishing the relative frequency of corneal and uveal tract affections, most common during the research period;
- describing clinical aspects and correlating them with various etiologic factors, but also with the results of the diagnostic methods;
- establishing the diagnostic approach for various affections, as corneal ulcer, corneal pathologic entities specific to the breed and species or uveitis;
- completing therapeutic protocols according to the evolutionary form, by appreciating and comparing some methods for the medical or radical treatment available to the veterinarian.

Chapter IV presents the material and methods, suggestively illustrated with 5 tables and 34 figures.

Chapter V details the obtained results during the 4 years of research, and the obtained data was presented in 21 tables and 250 figures.

For a complex study regarding the epidemiology of the corneal and uveal tract disorders in domestic carnivores, there were also used the records of the remaining Clinics (Internal

Medicine, Obstetrics, Parasitology, Infectious Diseases) at the Veterinary Medicine Faculty in Iași. By working with a population of domestic carnivores spread on a quite large area, it becomes difficult to estimate the incidence and prevalence of the corneal and uveal tract diseases, because not all sick animals are taken to the veterinarian. That is why these two terms were replaced with *relative frequency*, which referrs to the presented cases.

In order to undergo an epidemiological study as complete as possible, an *Ophthalmologic Observation Sheet* was conceived for carnivore pets with ocular diseases, especially corneal and uveal.

The epidemiological study permitted to settle the relative frequency of corneal and uveal tract diseases and, by correlating it with different intrinsic factors (animal species, breed, age, sex) and extrinsic (living environment), only where this aspect was relevant to the present study.

The results of the epidemiologic investigation revealed the fact that the species does not obviously influence the relative frequency of corneal diseases, as the latter recorded almost equal percentage for the two populations: 21,47% in dogs and 20,24% in cats.

The traumatic injuries (corneal wounds: superficial, deep or penetrating) or their consequences (simple or adherent leukoma) occupy first place in canine corneal pathology, with 31,96%. On the second place come corneal ulcers, with 26,02%, followed by chronic keratitis, that is 18,26% of all dogs. These traumatic lesions take the first place among corneal pathology in cats (51,02%), followed by herpetic keratitis including symblepharon (with 25,52%) and corneal ulcer with 14,28%.

Superficial ulcers were most frequent among the canine population, with 54,38%, followed by deep, complicated ones, with 28,08%. The most frequent cause of corneal ulcers in dogs was the traumatic exogenous one, totalizing up to 47,36 percents, followed by the endogenous trauma – entropion (26,31%) or KCS (8,78%). In cats, superficial ulcers were most frequent (57,14%), followed by the profound ones (35,72%). The most frequent cause for corneal ulcerations was represented by traumas, in 64,28% of cases, followed by the viral one (*Feline herpes virus 1*), with 21,44%.

As for corneal diseases specific to dogs, our researches revealed epidemiologic data about pannus and KCS. Therefore, most animals (62,5%) brought for consultation for chronic superficial keratitis belonged to this breed (German shepherd) and only 37,5% were half breeds of it. The average age of occurrence was 3-5 years, the majority of the sick animals (75%) being females.

The subjects belonging to the Pekingese breed represented 56,25 percent of KCS affections, followed by Cockers (31,25%). Of all these, intact females were most frequently affected, with 37,5%.

The most frequent cause was represented by the senile degeneration of the lacrimal gland, which stopped the normal tear production, for 31,25% of the subjects. The same percent of animals was offered by traumatic KCS and 25% were diagnosed with KCS secondary to the Carré disease. The congenital (or hereditary) cause occupies the last place in our classification, with 12,5%.

We diagnosed SCF exclusively in Persian breed cats, the majority being females (83,34%), with the average occurrence age of the specific symptoms of 2 years and 2 months. The lesions were bilaterally located in just one case, for the other cases the manifestation was of 66,67% for the right eye and 16,67% for the left eye.

As for uveal tract pathology, uveitis occupy the second place as frequency, with 26 percents of the canine population and 37,22% of the feline one.

Most uveitis (38,46%) were traumatic, followed by the immune mediated ones, 23,08% and 15,38 percents were represented by uveitis secondary to other ocular affections. Most frequently, dogs diagnosed with uveitis were intact males (42,31%), with high manifestation for animals with ages from 1 to 5 years (53, 84%) and with rare manifestation for animals older than 10 years (7,7%).

Most examined cats for inflammatory disorders of the uvea were male cats belonging to European breed (56,25%). Unlike dogs, most uveitis were idiopathic (31,25%), followed by traumatic ones (25%), secondary to other ocular affections (18,75%), and neoplastic with 12,5%. Most often, uveitis were diagnosed in cats aged from 5 to 10 years (68,75%), then came cats with ages from 1 to 5 years (12,5%) and one isolate case for a cat under 1 year.

The clinical picture for corneal diseases in domestic carnivores was represented by blepharospasm, photophobia and epiphora. Also, there were registered ocular discharge, with serous or mucopurulent aspect.

Local symptoms are represented by the corneal edema, of epithelial and endothelial origin, superficial or deep neovascularization, pigmentation, lipid or calcium accumulation, fibrosis and keratomalacia.

The traumatic lesions of the cornea are classified into superficial and profound wounds, be them penetrating or not, manifested by important blepharospasm of the affected eye and serous or seromucous ocular discharge. They can be accompanied by inflammation of the anterior uveal tract, especially the penetrating traumatisms. Almost all penetrating traumas ended with the flow of a certain quantity of aqueous humor and partial iris exteriorization through the thus created breach. The iris is covered in fibrin, and in the anterior chamber one could notice the existence of hyphema or hypopyon.

In CSG of the CG cases which we examined and diagnosed, the lesions are located bilateral, with advanced manifestation in one eye rather than the other for 37,5% of the cases. The most frequently affected corneal quadrant was the temporal-inferior for 75% of the cases. In 2 cases, brought in rather late for consultation, we noticed lesion extension on the entire surface of the cornea, with its complete opacification and with major visual deficit.

Along the necrotic lesion of the cornea, centrally located, surrounded by edema and superficial neovascularization, specific for SCF, we observed blepharospasm of the affected eye and mucoid discharge.

Corneal ulcer specific to herpes virus was observed in 21,44% of the cats with ulcerative lesions. The cats diagnosed with symblepharon came from the streets and were recovered by their real owners under various circumstances, cats for which we could only suspect the dramatic and chronic evolution of an infection located at conjunctivitis and cornea level, without the existence of a proper treatment. We did not notice any ocular herpes virus evolution in any cat brought up in an apartment.

Symblepharon turned out to be the most feared complication of local herpetic infection, because in 8 out of 10 cases it bilaterally located and it was complete, the cats thus being blind. For two male cats the lesion was unilateral, with incomplete symblepharon.

Chronic keratopathies are equivalent with local symptoms persistence, as the corneal edema, neovascularization and pigmentation. The pigmentation or corneal melanosis was encountered in old dogs, of distinct breeds, for which the owners mentioned the evolution of several symptoms, such as blepharospasm, photophobia and epiphora, or ocular discharge (mucoid or mucopurulent).

The diagnostic equipment that was used consisted of direct ophthalmoscope, slit lamp and tonometer, and the diagnostic tests were the Schirmer test, for measuring tear production, the Fluorescein dye test, for verifying the corneal epithelium integrity and verifying the permeability of the nasolacrimal duct. The fluorescein dye test turned out to be indispensable in corneal ulcerations cases, as various ulcer types demonstrate different staining patterns: epithelial-superficial or indolent and complex-stromal, deep or desmetocele. The utility of the fluorescein dye test proved to be unquestionable in epithelial lesions, invisible to naked eye, as well as for superficial ulcers or indolent ulcers.

The medical treatment of corneal ulcers intended to relieve the pain, limit and treat infections, control lysis, promote healing and avoid corneal neovascularization. The ocular pain was relieved by applying tropicamide eye drops. With the help of antibiotics we tried to limit and to fight infectious phenomena. For this, we used a broad spectrum antibiotic (gentamicin, tobramycin, ciprofloxacin, norfloxacin), applied locally, several times a day, until healing.

The lysis of the corneal stroma was fought by the instillation of acetylcysteine eye drops. We stimulated corneal healing by prescribing eye drops with vitamins A and E, or a dexpanthenol eye gel.

The application of the local treatment belonged to the owners, to whom we explained the principles and routes of administration of the medication. The therapeutic success is directly proportional with the owners' implication. Previously, we recommended cleaning the periocular area of the eventual secretions which could irritate the skin and cause agitation to the animal and we insisted for applying the Elizabethan collar for protection, until the end of the treatment.

The KCS therapy benefits from artificial tears, applied several times a day, *a la longue*, or it is based on associating these with the Cyclosporine eye ointment.

CSC of CG was treated with dexamethasone and cyclosporine, the therapeutic choice depending on the financial aspect. The feline corneal sequestrum benefited from local therapy with artificial tears and vitamins A and E, which are epithelial protectors, applied until the healing of the lesions.

The superficial ulcers or indolent epithelial ulcers needed to combine the medical treatment with manual debridment techniques and grid keratotomy, if healing does not occur after the first 10-14 days.

The chronic keratitis cases benefited from treating the primary pathology, such as entropion or KCS, for palliative purposes, while removal of the corneal pigmentation was not possible.

Although the surgery intervention is harder, needing equipment and various instruments for microsurgery and implying regular postoperative follow-ups, it was undergone in order to treat several primary corneal disorders, like the corneal dermoid, profound non-penetrating corneal wounds, presumed tumor formations, corneal staphyloma. We applied the following ophthalmic microsurgery techniques: superficial keratectomy, primary suture of the cornea, amniotic membrane or synthetic biomaterial Vet BioSIS T transplantation, followed by temporary tarsorrhaphy, for 7 to 10 days (according to the affection), with additional protective purpose.

The symptomatology of the uveal tract affections differ according to the pathological entity classification, from congenital abnormalities, to inflammatory and neoplastic ones. The congenital abnormalities are easily diagnosed upon clinical examination, while observing the changes of the color (heterochromia iridis); or the persistence of fibers from the old pupillary membrane in the anterior chamber, which are attached to the anterior lens capsule or to the corneal endothelium; or iris senile atrophy, with the apparition of full thickness defects in the iris, causing dyscoria.

Clinical symptoms for uveitis, registered during researches, were extremely large in number, from conjunctivitis inflammation in the perilimbic area, corneal edema, aqueous humor disorder and anterior chamber modification, with the appearance of hypopyon and hyphema, keratic precipitates, miosis, up to iris congestion and hypotension. Also, the uveitis complications encountered during researches were anterior synechiae, iris atrophy, cataract and glaucoma.

To establish an etiologic diagnostic, depending on complementary investigation possibilities, there were undergone some blood diagnostic tests (biochemical examination, haematological, serological); the examination of samples taken from the aqueous humor (cytological test, serological test); ultrasound examination.

The treatment of uveitis must be rigorous, the first step being the clinical diagnostic, then a symptomatic treatment was initiated in order to keep the inflammation under control (by using anti-inflammatory steroids or non-steroidal ones), to avoid synechiae formation (by using mydriatics/cycloplegics) and to fight pain (locally – cycloplegics, generally – analgesics).

The symptomatic treatment uses atropine, very useful in anterior uveitis, for its cycloplegic and mydriatic actions. In chronic uveitis cases or phacolytic uveitis, secondary to cataract, we used eye drops with non-steroidal anti-inflammatory, like indometacin, to limit long term complications.

The specific treatment was based on surgical and medical methods. Surgeries are indicated to stop a pyogenic outbreak, able to sensitize the uvea, the best example being in case of pyometra, and hysterectomy was followed by the healing of the uvea. The medicamentary therapy supposes using antibiotics, in case of infection located in a distinct area but for the eye.

Accompanied or not by secondary uveitis and taking into account the clinical presentation, both local and general, as well as the lack of treatment possibilities, the therapeutic decision in case of uveal neoplasia is to enucleate the ocular globe, if the owners agree with it.