Comparative analysis of different methods of treatment of atopic otitis in dogs

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Abstract

Atopic otitis externa is an inflammation of the external ear canal caused by environmental allergen. It involves a correlation between otitis flare episodes and seasonal allergy periods. Otitis is often the first sign of an underlying allergy. Successful management involves identification and analysis of all factors (primary, secondary, predisposing and/or perpetuating). Our study was comprised of a total of 29 dogs (n = 29) of various breeds and ages. Diagnosis of atopic otitis was based on history, clinical signs, general examination, dermatological and otoscopic examination, cytology of the ear canal, culture and sensitivity testing, MRI and food diet trial with hydrolyzed protein in order to differentiate atopic vs food induced otitis. Treatment was based on a reactive therapy followed by a proactive therapy. Long-term management was an important part of a good strategy. It involved treatment of the primary cause, monthly check-up, weekly proactive therapy, at-home cleaning of the ear canal and detailed instructions for proper care and symptom evaluation to the owners. Owner feedback was extremely valuable as early detection of symptom recurrence was crucial for the ultimate success. In this study, all but one of the patients exhibited long-term dissipation of symptoms without relapsing for a period of 6 to 8 months.

***Key words**:* canine atopic otitis externa (CAOE), pro-active therapy, video-otoscopy, deep ear cleansing, ear cytology

Сравнителен анализ на различни методи за лечение на атопичен отит при кучета

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Резюме

Атопичният външен отит е възпаление на външния ушен канал, причинено от алергени от околната среда. Това включва връзка между епизодите на обостряне на отит и периодите на сезонна алергия. Отитът често е първият признак на скрита алергия. Успешното управление включва идентифициране и анализ на всички фактори (първични, вторични, предразполагащи и/или продължаващи). Нашето проучване се състои от общо 29 кучета (n = 29) от различни породи и възрасти. Диагнозата на атопичния отит се основава на анамнеза, клинични признаци, общ преглед, дерматологичен и отоскопски преглед, цитология на ушния канал, микробиологично изследване и тест за чувствителност, ЯМР и хранителна диета с хидролизиран протеин, за да се разграничи атопичният от индуцираният с храна отит. Лечението се основава на реактивна терапия, последвана от проактивна терапия. Дългосрочното управление беше важна част от добрата стратегия. То включваше лечение на основната причина, ежемесечен преглед, седмична проактивна терапия, домашно почистване на ушния канал и подробни инструкции за правилна грижа и оценка на симптомите от собствениците. Обратната връзка от собствениците беше изключително ценна, тъй като ранното откриване на рецидив на симптомите беше от решаващо значение за крайния успех. В това проучване всички пациенти с изключение на един показват дълготрайно изчезване на симптомите без рецидив за период от 6 до 8 месеца.

Ключови думи: кучешки атопичен външен отит (CAOE), проактивна терапия, видеоотоскопия, дълбоко прочистване на ухото, цитология на ухото

Introduction

Otitis externa is an inflammatory disease of the external ear canal, including the ear pinna. Otitis externa may be acute or chronic. Atopy (environmental allergy) is the leading cause that can be associated with allergy-induced otitis externa in dogs, with food allergy and flea allergy being factors to a lesser degree. Most dogs with canine atopic dermatitis as their primary cause for ear disease develop otitis between 1 and 5 years of age with 31% presenting with ear disease before 12 months of age (Zur et al., 2011). Dog breeds that show allergic otitis with the highest frequency are: Labrador Retriever, Golden Retriever, Bulldogs, German Shepherd dog, Cocker Spaniel, Yorkshire terrier, and West Highland White Terrier. In our study also a significant presence of mix breed dogs was observed. It is important to note that all dogs in our research were subjected to adequate monthly control for fleas and ticks. A dog with allergic otitis will have an ear canal in which persistent ear infections can chronically cause scarring of the ear tissue. This leads to significant stenosis, fibrosis and possible ossification of the ear canal and reduction of the lumen of the ear canal. It is a vicious circle of chronic functioning, such as the production of earwax and inflamed ear secretions, narrowed canal and more difficult evacuation of earwax and secretions from this severely constricted canal. All this results in the poor management of allergic otitis. The treatment gets even more difficult because the therapy can hardly reach the deeper areas of the ear canal. (Favrot et al., 2010; Harvey and Paterson, 2014; Zur et al., 2002).

The study involved both reactive and proactive therapy. Reactive therapy induces clinical remission with local and oral medication. Proactive therapy supports the achieved results and to reduce the possibility of recurrence of symptoms by using a scheme of long-term treatment.

Successful otitis management is associated with good analysis, identification and treatment of all factors: Primary, secondary, predisposing and perpetuating factors. (Griffin, 2010).

Materials and Methods

Animals

Included in this study were 29 dogs (n = 29), aged between 11 months and 10 years, that have presented in Multidisciplinary Veterinary Clinic Bulgaria by 2022 with symptoms corresponding to canine atopic otitis externa. All medical procedures were performed in accordance with animal welfare laws and regulations and with the written permission of the owners.

Otoscopy

Otoscopy is a visual examination of the ear canal and the eardrum with an otoscope. The otoscope used in this study was a Heine beta vet Otoscope set 2.5 V. The aim was to examine the vertical and horizontal canal and the tympanic membrane (TM). Canine TM is composed of pars flaccida and pars tensa. In cases of otitis externa without infection in the middle ear the TM is shiny, thin, translucent with visible manubrium. The pars flaccida gets swollen when there is an increased pressure in the middle ear. In such a case, it is not always clearly and easily visible. The pars tensa is mainly visible when the TM is examined during otoscopy. All dogs in this study have undergone otoscopy examination. Cole (2010).

Ear Cytology and Culture and sensitivity testing

In case the otoscopy examination revealed clinically significant abnormalities, samples from the ear canal were taken to undergo cytology and/or culture and sensitivity testing. The cytology was obtained from the junction between the vertical and horizontal aspects of each external ear canal (EEC). Cytology of ear canal was performed with a non-sterile swab on all dogs in this study. Culture and sensitivity testing was performed with a sterile swab (Transwab, China) on 2/29 dogs.

For cytology Diff Quick type staining with Hemacolor Rapid kit, 111674001 (Merck) and Microscope Euromex Bio Blue (Netherland) were used. The cytology samples were examined in 10 oil-immersion fields.

The samples for culture and sensitivity testing were conducted in a reference laboratory – Independent Medical Diagnostic Laboratory "Kandilarov", accredited by ISO 9001:2008, using the diffusion method. (Angus, 2004; Cole et al., 1998; Harvey and Harari, 2005; Tater et al., 2003).

MRI

MRI is a crucial part of PSOM diagnosis. It was performed on all dogs in this study. The MRI machine used was an Easaote vet – MR (Easaote, Italy). Brain and whole spine transverse and sagittal images in T2- and T1-weighted were performed. Patients were under general anesthesia with positive ventilation (Veterinary Ventilator RWD R 409 Plus, China). On 3/29 dogs MRI was performed. (Garosi et al., 2003; Maroldi et al., 2001; Miller et al., 2013).

Video otoscopy

Video otoscopy is a method comparable to standard otoscopy, but it uses a high-powered, fiber-optic camera, enabling in-depth visualization of the vertical and horizontal ear canals and the eardrum. The patient must be under general anesthesia with Isoflurane, intubated with a secure endotracheal tube with a well inflated balloon in order to prevent fluid aspiration from auditory (Eustachian) tube drainage. (Nuttall and Bensignor, 2014).

The otoscope was attached to a port that enabled thorough flushing and suction of the ear canal, facilitating the removal of wax, mucous, debris and other foreign matter. In this study for video otoscopy a Karl Storz Veterinary otoscope 67260 OSA set with diameter 5 mm, length 8,5 cm, GmbH and Co. KG, Tuttlingen, Germany with working channel diameter 5 mm and stopcock attachment with integrated working channel and LUER - Lock adaptor for irrigation was used. Video otoscopy in this study was performed on 11 out of 29 dogs. Pictures and video were captured and shared with the owners. In 1/11 dogs an additional multi-injection intra otic/intralesional method was needed to be performed during video otoscopy monitoring.

Deep ear cleaning

During video otoscopy a deep ear cleaning was performed. Deep ear cleaning is a very important step. The goal is to achieve a maximumly clean canal through numerous flushings, aspiration and mechanical cleaning. This way the eardrum can be visualized as best as possible. A saline bag (0,9%Naci, Braun, Germany) was attached to the work channel of the video otoscope. For aspiration a Vet pump Storz, Outer tube with Luer Lock adaptor 67479 S or 5 F urethral catheter attached to the Vet pump was used. I performed numerous suctions and irrigations with saline. With ear curret (Karl Storz 76261 K, small, 5 F,length 30) I made fast reduction of the cerumen and debris. In some cases, it was necessary to use a Karl Storz Grasping Forceps, 5Fr, length 34 cm for fast reduction of big ceruminolytes. When strong waxy debris or drier wax accumulation was observed (in 2/29 dogs) we used solution Otoprof (ICF, Italy) which had a strong cerumenolytic effect, finishing off with saline flushing.

In cases of suppurative otitis externa associated with bacteria (Pseudomonas aeruginosa 1/29 dogs and Staphylococcus intermedius 1/29 dogs) or Malasseziaspp., (in 27/29dogs) when we suspect biofilm formation we start flushing with saline (to reduce the amount of purulent secretions), Otodine (ICF, Italy) which contains chlorhexidine digluconate 0,15%, Tris-EDTA with pH 8 that alters the permeability of the cell membranes of bacteria and fungi and helps prevent the formation of new biofilm, then Tris Nac (ICF, Italy) which contain Tris-EDTA and N-acetyl cysteine to break down existing biofilm. (Cole, 2010: Nuttall and Cole, 2004; Nuttall and Bensignor, 2014)

During deep ear cleaning the cytology probes were taken in all 29 dogs. In cases of presents of rods, the samples for culture and sensitivity testing were taken too (2/29).

Complete blood count (CBC) and a serum biochemistry panel (SB)

CBC was done in Multidisciplinary Veterinary Clinic Bulgaria by Mindray BC-5120. Proteins (total protein, albumin), liver enzymes (ALT, ALP), Bilirubin, Kidney Tests (urea, creatinine, and P) and Ca have been performed in Multidisciplinary Veterinary Clinic Bulgaria by Mindray BS-200.

Serum and intradermal allergy

In 5/29 an additional allergy test was recommended. Intradermal allergy test was performed with a Nexmune Artuvetrin® intradermal kit in Multidisciplinary Veterinary Clinic without anesthesia. Serum allergy test was performed by Nextmune (Next+ Serum test). It detects IgE in the serum of cats and dogs and it employs a new generation of CCD blockers for high specificity and sensitivity. Based on these tested an allergen specific immunotherapy (ASIT) was created and applied.

Subsequent therapy

Atopic dogs suffering from CAOE were included and proactively treated for at least 6 months with a weekly application of Dexamethasone 1% in the ear canal. Ear cleanser were prescribed for application at variable intervals, depending on each individual case. All but one dog was treated bilaterally. 10 out of all dogs were also treated systemically (for various periods of time) with steroids, cyclosporine, oclacitinib, ASIT or treated topically with an array of medications. (Colombo et al., 2007; Favrot et al., 2010; Harvey and Paterson, 2014)

Results

29/29 dogs had serum biochemistry profile and CBC before local therapy with steroids and then again in a period of 6 months after the beginning of the proactive therapy. All of these results showed no change from baseline. 29/29 dogs had both a general examination and a dermatological examination. 18/29 dogs did not have other signs of atopy, just CAOE. 11/29 dogs had more than one sign of atopy. 1/29 dogs displayed abnormalities in the TM. It had large and easily visible bulging of the pars flaccida. Another dog did not present abnormalities in the TM which had flat pars flaccida, but later after MRI, PSOM

was confirmed. 1/29 dogs did not have a clearly visible TM due to severe narrowing of the ear canal.

At initial examination:

16/29 dogs displayed erythema of EEC; waxy and dark-brown ear discharge with TM not easily visible before deep ear cleaning. OTIS 3 score for left/right ear was as following: from 3 to 6 and from 3 to 7.

1/29 dogs displayed erythema of EEC, erosion, oedema and exudate. OTIS 3 score for left/right ear was a following: 9/7. TM was not visible before deep ear cleaning.

1/29 dogs displayed strong oedema of EEC and exudate. OTIS 3 score for left/right ear was a following: 8/1. TM was not visible because of stenosis of the ear canal.

7/29 dogs displayed moderate changes of erythema and/or oedema of the EEC and exudate. OTIS 3 score for left/right ear was as following: 5/5, 4/5, 6/3, 4/3, 4/6, 5/2, 6/4.

4/29 dogs displayed discreet changes of erythema and exudate of EEC; waxy discharge; OTIS 3 score for left/right ear was as following: 2/3, 2/4, 2/3, 4/2.

At each monthly control check-up every dog displayed improvement or lack of worsening in the OTIS 3 score.

In 2/29 dogs we started oral Prednisolone in a dose of 1 mg/kg/24 h per osin order to reduce the pain, exudation and oedema and to perform video otoscopy after a few days. (Cole, 2010; Cole et al., 1998; Nuttall and Bensignor, 2014)

In 28/29 dogs cytology samples were negative for rods; 1/29 cytology samples showed many rods (more than 10/oil-immersed field - OFI) plus inflammatory cells and DNA strands; 1/29 cytology samples showed a large number of cocci (more than 10/OFI) plus a large number of inflammatory cells, DNA strands, phagocytosis and yeast; in 2/29 only single *Malassezia pachydermatis* (less than 5/OFI) were detected; in 15/29 only *Malassezia pachydermatis* (more than 5/OFI) were detected; 8/29 had a large number of cocci (more than 10/OFI), a large number of *Malassezia pachydermatis* (more than 5/OFI); 2/29 large number of cocci (more than 10/OFI), a large number of *Malassezia pachydermatis*(more than 5/OFI), plus single inflammatory cells and DNA. Accordingly, culture and sensitivity testing were performed in those last 2/29 cases.

Pseudomonas aeruginosa was detected in 1/29 dogs. *Staphylococcus pseudintermedius* was detected in 1/29 dogs and it was sensitive to Gentamicin confirmed by culture and sensitivity testing. We used local therapy for two weeks: (1) ex tempore prepared eardrops with Gentamicin and Dexamethasone (1 mg/ml Gentamicin and 2 mg/ml Dexamethasone) – 0.3 ml/12 h/in the EEC; (2) Ear cleaning with Otodine (ICF, Italy) / twice per day. A control examination and culture testing were performed post therapy. It was negative and the dog entered for the next procedures of the study.

27/29 dogs were prescribed Otoact (ICF, Italy) and Clorexydermoto piu (ICF, Italy) for control of the cerumen rich ear wax and the secondary infection with Malassezia pachydermatis.

25/29 dogs were started on a food diet with hydrolyzed protein for a period of 12 weeks. 23 of these 25 dogs showed no changes that could relate their otitis to otitis associated with food allergy. 2/25 dogs during this hydrolyzed diet test showed signs that could possibly suggest parallel presentation of CAOE and food sensitivity related otitis.

Seasonality of CAOE was observed in 22/29 dogs.

MRI was performed on 3/29 dogs. One dog presented with PSOM and was subsequently excluded in regard to CAOE. The second dog had extensive narrowing of the horizontal and vertical part of the ear canal without infection of the middle ear. The third dog underwent MRI examination only in order to eliminate middle ear infection. Imaging confirmed only mild changes in the structure of the ear canal and absence of infection of the middle ear.

Additionally, during the study 5/29 dogs were put on Allergen-specific immunotherapy (ASIT) after performing serum and/or intradermal allergy testing. 1/29 dogs were put on a cyclosporine therapy (5 mg/kg/24 h initially, reduced to 5 mg/kg/twice weekly) and 2/29 dog were put on Oclacitinib (Apoquel ®) at a dose of 0,5 mg/kg/24 h.

At the end of this study 1/29 dogs unilaterally and 28/29 dogs bilaterally entered remission for CAOE.

Discussion

The purpose of this study was to show that topical weekly application of 1% Dexamethasone in the ear canal is effective at preventing the recurrence of canine atopic otitis externa. This study evaluated both the systemic and local safety of a long-term intermittent application of 1% Dexamethasone in the ear canal.

During initial otoscopy examination we used a clinical score for canine otitis externa OTIS 3: erythema, oedema, erosion/ulceration, and quantity of exudate (Nuttall and Bensignor, 2014). This scoring systems allows for an accurate and objective evaluation of the ear canal and to compare the condition at the control check-up. OTIS 3 scoring was also used at each monthly control check-up thereafter.

Otoscopy is an important and indicative method, which is also readily available, but in cases of pain, large amounts of ear wax, oedema and/or a patient who does not tolerate examination, it cannot be used adequately.

After culture and sensitivity testing, we performed Amikacin 15 mg/kg/24 h i.m. for 10 days while monitoring kidney values every 3 days. We used local therapy too: Tris NAC (ICF, Italy) in the ear canal every 12 h for the first 5 days, after that reducing to once daily for another 5 days, then five applications every other day and finally once weekly for a prolonged period of time; eardrops with 1% Dexamethasone 0,5 ml/12 h for 5 days, reducing gradually until reaching a dose of 0,5 ml/twice weekly and finally 0,5 ml/once weekly. In order to support the natural self-cleaning of the ear canal a long-term therapy with a cerumen softening ear cleanser Otoact (ICF, Italy) was prescribed. Due to severe pain the patient was started on Prednisolone 1 mg/kg per os and after one week video otoscopy was performed. During videoscope 2% Dexamethasone was injected intra otic/intralesional for inhibiting fibroblasts and reducing collagen in the ear canal wall. The intralesional treatment was accomplished by injecting numerous small amounts of Dexamethasone into the dermis of the canal wall. A long spinal needle (4–6 inches) was passed through the otoscope cone. A ring of injections was made after which the cone was withdrawn, and another ring of injections was made. The topography of injection was as following: medial, lateral, anterior and posterior aspect of the canal wall. Hemorrhage may be extensive and repetitive flushings may be required for continued visualization.

Pet owners were asked to evaluate the general efficacy of the treatment and the ease of use of the proactive therapy (easy – normal – difficult). All owners reported good results and found a significant improvement in their pets' comfort of life. Also, all owners reported that the use of the therapy was easy and better than pervious methods that they have tried.

Conclusion and Recommendations

There is a vast abundance of different types of ear related diseases. Good knowledge of the symptoms, use of various diagnostic methods, and use of modern imaging technology should all be employed in synergy in order to be able to accurately diagnose and treat each individual case. Studies like this are extremely important because they raise awareness in the general public, veterinary medical professionals and dog owners regarding an ear disease that can be difficultly managed.

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