

Computed tomographic findings in 205 dogs with clinical signs compatible with middle ear disease: a retrospective study

Audrey Belmudes^{*1}, Charline Pressanti^{*}, Paul Y. Barthez[†], Eloy Castilla-Castaño^{*}, Lionel Fabries[‡] and Marie C. Cadiergues[§] 

^{*}Small Animal Hospital, Dermatology Service, Université de Toulouse, ENVT, 23 chemin des Capelles, 31076 Toulouse, France

[†]Vedim, 70 rue Nicolas Margue, 4979 Fingig, Luxembourg

[‡]Centre Scanner Vétérinaire, 45 avenue de Toulouse, 31650 Saint Orens, France

[§]UDEAR, Université de Toulouse, INSERM, ENVT, 23 chemin des Capelles, 31076 Toulouse, France

Correspondence: Marie C. Cadiergues, UDEAR, Université de Toulouse, INSERM, ENVT, 23 chemin des Capelles, 31076 Toulouse, France.

E-mail: mc.cadiergues@envt.fr

Background – Computed tomography (CT) is considered to be the reference method to evaluate middle ear structures.

Objectives – To evaluate the presence and severity of CT changes in the middle ear and establish if any specific clinical presentations are associated with otitis media.

Animals – Medical records of animals referred for CT with history and clinical signs consistent with middle ear disease.

Methods – Retrospective evaluation of CT examinations of tympanic bullae performed over a six year period. Medical records were reviewed for signalment, clinical signs and cytological evaluation of the external ear canal. Dogs were divided into three clinical groups: chronic otitis externa (Group 1), peripheral vestibular disorder (Group 2) and other clinical presentations (Group 3).

Results – Group 1 – Of 214 ears, 87 (40.7%) had CT abnormalities: 38 of 87 (17.7%) had material-filled bullae, 42 of 87 (19.6%) had thickened bullae walls and seven of 87 (3.2%) had lysis of the bulla. Abnormalities were significantly more frequent in dogs with suppurative otitis than in erythematous–ceruminous otitis (57% and 23%, respectively; $P = 0.003$). Proliferative otitis, particularly in French bulldogs, was associated with severe otitis media.

Group 2 – Of the 106 ears, 91 (85.8%) had normal tympanic bullae.

Group 3 – Of the 26 ears from deaf dogs, 17 had filled bullae; all nine affected dogs were Cavalier King Charles spaniels. All dogs with Claude Bernard Horner syndrome or head tilt had normal tympanic bullae.

Clinical significance – CT is useful for canine chronic otitis externa, particularly in suppurative or proliferative otitis, even in the absence of associated neurological signs.

Introduction

Otitis media is a common extension of external ear disease and often occurs secondary to chronic otitis externa in up

to 50% of cases.¹ Conversely, the presence of otitis media is a potential cause of otitis externa treatment failure, and reaching a definitive diagnosis is necessary to determine appropriate management. Otitis media, or more generally middle ear disease, is often challenging to diagnose. Presenting signs are commonly similar to those of otitis externa and cannot be distinguished in the absence of facial and/or sympathetic nerve dysfunction.² Furthermore, otitis media can progress in some cases to otitis interna and can cause signs of peripheral vestibular syndrome.³

Because of the complexity of this anatomical region and overlying bony structures (within the temporal bone), it is difficult to assess the middle ear with radiography, even with special projections, without expertise.⁴ The absence of a tympanic membrane is suggestive of otitis media but adequate otoscopic examination is often difficult to perform due to concurrent otitis externa. An intact tympanic membrane does not rule out otitis media.^{5,6} Radiographic examination of the middle ear is challenging

¹Present address: Azurvet Hippodrome, 2 Bd Kennedy, 06800 Cagnes sur Mer, France.

Part of this study was previously presented as an oral communication at the Residents and Interns short communications session at the AFVAC (Association Française des Vétérinaires pour Animaux de Compagnie) Conference (Nantes, December 2013).

Abbreviations: CBH, Claude Bernard Horner; CKCS, Cavalier King Charles Spaniel; CT, Computed tomography; MPR, Multiplanar reconstruction; MRI, magnetic resonance imaging; TECA-LBO, total ear canal ablation and lateral bulla osteotomy. Accepted 6 August 2017

Source of Funding: This study was self-funded.

Conflicts of interest: No conflicts of interest have been declared.

and requires several projections with exact positioning to limit the superimposition of the bone structures of the skull.⁷ Despite those precautions, radiography is not considered to be sensitive for the diagnosis of otitis media.⁸ Ultrasound imaging has also been evaluated; it can be helpful but should not replace CT for the diagnosis of canine OM because of its lower sensitivity than cross-sectional imaging, as well as variations due to positioning of the patient and accuracy depending on the sonographer's experience.⁹

Imaging techniques such as computed tomography (CT) and magnetic resonance imaging (MRI) are complementary imaging methods that have superior diagnostic value over other imaging modalities. Computed tomography is used to better define bony structures, whereas MRI allows better definition of soft tissue structures (especially inner ear labyrinth fluid and intracranial structures). The availability, cost, shorter scanning time and the maximized visualization of bony structures make high-resolution CT the method of choice in the imaging of the middle ear in humans.¹⁰ Computed tomography has been proposed as an alternative to evaluate middle ear structures in animals.^{7,10–13} This noninvasive diagnostic technique allows visualization of anatomic structures in cross-section, while avoiding the superimposition of ear structures, which occurs on radiographs. Therefore, CT appears to be more sensitive and specific compared to radiography in diagnosing middle ear disease.¹¹

The purposes of this retrospective study were (i) to evaluate the results of the tomographic examination of tympanic bullae, the lesions and their severity, related to the clinical presentation in dogs with chronic otitis externa, peripheral vestibular disease and other diseases, including deafness and Horner's syndrome; and (ii) establish if specific clinical presentation(s) were predictive of otitis media.

Materials and methods

Sample population

A computer search was performed from the medical records of a veterinary CT referral centre in the Toulouse district of France. Dogs with history and clinical signs which were suggestive of middle ear disease [including chronic otitis externa, peripheral vestibular syndrome, deafness, Claude Bernard Horner (CBH) syndrome, pruritus or head shaking without otitis externa, head tilt and painful mouth opening] and for which a CT evaluation of the middle ear had been performed between 2009 and 2014 were included.

Signalment was obtained from the referring veterinary practices' medical record databases. The following data were recorded: age, gender, breed, clinical signs, otoscopic findings and other tests results, particularly cytological examination of samples from the external ear canal, when performed.

Three groups were defined depending on the clinical presentation. Group 1 comprised dogs with chronic otitis externa persisting for more than six months; they were divided into three subgroups: dogs with suppurative otitis (inflammation and purulent discharge with presence of inflammatory cells on cytology), erythematoceruminous otitis (inflammation, nonpurulent discharge and absence of inflammatory cells on cytology) and proliferative otitis (hyperplastic tissue occluding the external canal and expanding to the meatus). Dogs with peripheral vestibular disorder defined Group 2. Peripheral vestibular syndrome was diagnosed clinically, based on the observation of vestibular ataxia, positional ventrolateral strabismus, ipsilateral head tilt and nystagmus. Group 3 included dogs with other clinical presentations potentially referable to middle ear disease including

deafness, CBH syndrome, otic pruritus without otitis externa, head tilt and pain on mouth opening.

Computed tomography techniques and image evaluation

All dogs had a CT examination of the entire skull under general anaesthesia positioned in ventral recumbency. Scans were performed using a 2-slice multidetector scanner (Mx 8000 DUAL scanner, Philips France; Suresnes, France). Contiguous transverse 1 and 2 mm thick images were acquired before and after intravenous administration of 2 mL/kg of iodinated contrast medium (ioxitalamate of meglumine, Telebrix 35, Guerbet France; Villepinte, France) and reconstructed using bone and soft tissue algorithms. Multiplanar reconstruction (MPR) was used as needed.

For each ear, the presence or absence of the following CT findings was recorded: soft tissue attenuating material/fluid in the tympanic bulla; normal, thickened or lytic bulla wall; ear canal mineralization; soft tissue attenuating material/fluid in the ear canal; appearance of the adjacent bony structures (temporal bone), adjacent soft tissues (surrounding lymph nodes, muscle) and post-contrast enhancement. Lesions of the bullae were divided into four categories (Figure 1): (a) absence (i.e. normal tympanic bulla); (b) soft tissue material/fluid in the tympanic bulla; (c) irregular thickening of the tympanic wall associated with material within the tympanic cavity; and (d) partial or total destruction of the bulla wall consistent with osteolysis.

Data analysis

A Pearson's chi-square test was used to compare the correlation between tympanic bulla lesion and clinical findings. A value of $P < 0.05$ was used to define significance.

Results

Population

Two hundred and five dogs of the 217 first identified had complete information and were included in the study, resulting in a total of 380 ears available for evaluation. Of the 205 dogs, 101 were females and 104 were males. The median age of affected dogs was seven years (range 0.5–15 years). A large variety of breeds were represented. The most common breeds in the study population were French bulldogs ($n = 29$, 15%), cavalier King Charles Spaniels (CKCS) ($n = 13$, 6.5%), cocker spaniels ($n = 10$, 5%) and West Highland white terriers ($n = 7$, 3.5%) (see Table S1).

Clinical presentation

Group 1 comprised 214 affected ear canals from 122 dogs. Systemic signs (anorexia, hyperthermia) were rare ($n = 2$). Neurological signs including vestibular disorder and facial paralysis were associated in four and two cases, respectively. Otitis externa was bilateral in 92 dogs and unilateral in 30 dogs. In dogs with concurrent otitis and neurological signs, otitis was bilateral in four cases and unilateral in two cases.

Otitis was erythematoceruminous in 87 ears, suppurative in 83 ears and proliferative in 44 ears. The subgroup of dogs with proliferative otitis comprised 44 ears (26 dogs); dogs were principally French bulldogs (14 of 26 dogs and 25 of 44 ears). On available cytological examination (203 ears), no micro-organisms were found in 22 ears. Rods were present in 108 ear canals, alone ($n = 39$) or combined with cocci ($n = 62$) or *Malassezia* yeasts ($n = 7$). Additionally, cocci were observed alone ($n = 19$) or combined with *Malassezia* ($n = 17$). *Malassezia* yeasts alone were present in 37 canals.

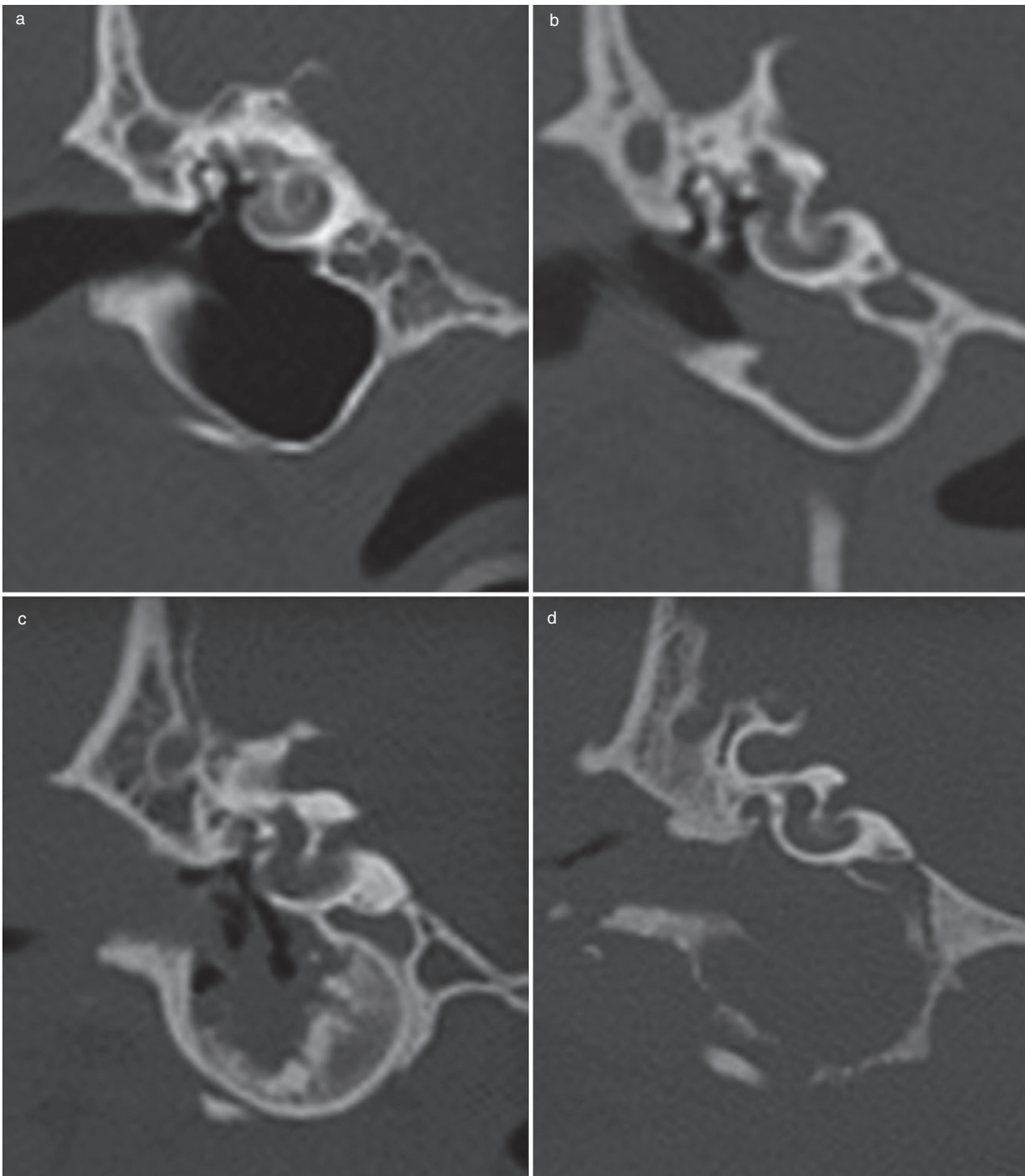


Figure 1. Computed tomography (CT) lesions of the middle ear.

Selective CT images of (a) normal right tympanic bulla, (b) fluid-filled tympanic bulla and normal thin wall, (c) fluid-filled tympanic bulla with thickened irregular wall and (d) lysis of the wall with fluid-filled tympanic bulla.

Group 2 included 106 ears (53 dogs) with a peripheral vestibular syndrome but no otitis externa. The absence of abnormalities of the external canal was objective and based on an otoscopic examination. Dogs presented with at least two of the following signs: head tilt ($n = 102$ ears), falling/ataxia ($n = 100$ ears), nystagmus ($n = 30$ ears), circling ($n = 12$ ears) and facial paralysis ($n = 24$ ears). Systemic signs [dullness (seven), anorexia (four) and vomiting (two)] were present in seven cases.

Group 3 comprised 60 ears (30 dogs). Clinical presentations were deafness ($n = 26$ ears; nine dogs were CKCS), CBH syndrome ($n = 14$ ears), pruritus or head shaking without otitis externa ($n = 10$ ears), head tilt ($n = 6$ ears) or painful mouth opening ($n = 4$ ears).

Lesional assessment of the tympanic bullae

Group 1 – Of the 214 ears with chronic otitis externa, 87 (40.7%) had CT abnormalities: 38 (17.7%) had

material-filled bullae, 42 (19.6%) had thickened bullae walls and seven (3.2%) had lysis of the bulla. Among the dogs presented with otitis (10 ears) and concurrent neurological signs, four bullae were normal, five were filled and one had thickened bullae walls (Table 1).

Tympanic bulla abnormalities were significantly more frequent in dogs with suppurative otitis than in erythematoceruminous otitis (57% in suppurative versus 23% in erythematoceruminous; $P = 0.003$). The results of ear canal cytology were not predictive of middle ear abnormalities ($P = 0.46$). Proliferative otitis was significantly associated with otitis media in 68% of cases ($P < 0.001$).

When mineralization of the ear canal wall was observed, middle ear abnormalities were present in 29 of 64 (45%) canals. This was not significantly different from nonmineralized ear canals (lesions in tympanic bullae in 58 of 150; $P = 0.36$).

Group 2 – Of the 106 ears from dogs with vestibular disorders, 91 (85.8%) had normal tympanic bullae and 15 showed CT abnormalities: 10 dogs had bilateral middle ear disease (five material-filled bullae and five bullae with thickened bullae walls) and five had unilateral middle ear disease otitis media (three material-filled bullae and two bullae with thickened bullae walls).

Group 3 – Of the 60 ears from dogs with other conditions, 37 (61.7%) had normal tympanic bullae and 23 showed CT abnormalities. Of the 26 ears from deaf dogs, 16 had fluid-filled bullae and were from dogs bilaterally affected, one had only one fluid-filled bulla and all nine dogs were CKCS. All dogs with CBH syndrome (14 ears) or head tilt (six ears) had normal tympanic bullae. Of the 10 ears from dogs showing pruritus or head shaking, six had normal bullae, two had unilateral filled bullae and two had thickened bullae walls (same dog). Of the four ears from dogs presenting with painful mouth opening, two had normal bullae, one was fluid-filled and one showed thickened bullae walls.

Discussion

The most common breeds presented for CT evaluation of chronic otitis externa in our study were French bulldogs, CKCS, cocker spaniels and West Highland white terriers. This may be related to an increased rate of underlying

hypersensitivity disorders or defects in anatomical ear canal conformation in these breeds.^{2,14}

The prevalence of middle ear CT lesions in the current study was 32.9%. This is higher than a previous study where the prevalence of otitis media was reported as 19.5% in dogs presented for CT scan of the head or cervical spine.¹² However, comparison should be considered cautiously because the reasons for referring cases for CT can vary amongst referring veterinarians. Furthermore, Group 1 comprised 122 dogs referred for CT imaging to further investigate chronic otitis externa; by comparison in the other study, only 19 of 199 dogs were referred for evaluation of suspected ear disease.¹²

In the current study, middle ear lesions were more frequently observed in dogs with chronic otitis externa (40% of the ears) than in dogs presenting with peripheral vestibular disorder without evidence of otitis externa (14.2%). In the small subgroup of dogs suffering from otitis externa with neurological signs (six dogs, 10 ears with evidence of otitis externa), middle ear lesions were present in 60% of the ears. In a study which evaluated MRI in dogs with vestibular disorders, 41% of dogs (11 of 27) with peripheral vestibular disorder had magnetic resonance abnormalities compatible with otitis media.¹⁵

Chronic suppurative otitis was much more commonly associated with middle ear disease than erythematoceruminous otitis, 44.6% and 23%, respectively. This feature is potentially of great importance for the veterinarian who is dealing with canine chronic otitis and emphasizes the necessity of systematically performing cytological evaluation from the external ear canal in all cases. Suppurative otitis is defined as the presence of neutrophils in the external ear canal. The fact that in almost one case out of two, a dog with a chronic suppurative otitis externa may have concurrent middle ear lesions, indicates that more investigations and management are needed in these cases. The prolonged presence of inflammatory cells such as neutrophils could contribute to an excessive production of proinflammatory cytokines and proteases,^{16,17} which may damage the tympanic membrane and eventually contribute to its perforation. The type of microbial infection (fungal, bacterial or mixed; coccoid or rod-shaped bacteria) was not associated with middle ear CT lesions. Mineralization of the ear canal also was not

Table 1. Lesions of the middle ear observed with computed tomography (CT) in three groups of dogs, expressed in number of ears

CT lesions	Normal middle ear	Fluid-filled bulla	Bulla wall thickening	Partial or total destruction of the bulla wall	Total
Group 1					
Chronic otitis externa	127 (59.3%)	38 (17.7%)	42 (19.6%)	7 (3.2%)	214
Erythematoceruminous	67 (77%)	10 (11.5%)	10 (11.5%)	0	87
Suppurative	46 (55.4%)	15 (18.1%)	17 (20.5%)	5 (6%)	83
Proliferative	14 (31.8%)	13 (29.5%)	15 (34.1%)	2 (4.6%)	44
Group 2					
Vestibular disorder	91 (85.8%)	8 (7.5%)	7 (6.6%)	0	106
Group 3					
Others	37 (61.7%)	20 (33.3%)	3 (5%)	0	60
Deafness [CKCS]	9 (1) [34.6% (5.6%)]	17 (17) [65.4% (94.4%)]	0	0	26 [18]
CBH, head tilt	20 (100%)	0	0	0	20
Pruritus, head shaking	6 (60%)	2 (20%)	2 (20%)	0	10
Painful mouth opening	2 (50%)	1 (25%)	1 (25%)	0	4

CKCS Cavalier King Charles Spaniel, CBH Claude Bernard Horner syndrome.

associated with tympanic bulla CT lesions. However, it should be considered as an irreversible sign of chronicity and may orientate the clinician toward a surgical management of the otitis.¹⁸

Dogs with proliferative otitis externa were defined as a subgroup within Group 1 and French bulldogs were over-represented. This form of otitis externa is characterized by marked ceruminous gland hypertrophy and hyperplasia, acanthosis and proliferation of soft tissues resulting in stenosis and obstruction of the external ear canal.¹⁹ Changes develop in weeks to months inside the external ear canal, leading to irreversible occlusion of the canal. The middle ear can also be filled in with tissue mixed with exudate. In the current study, approximately two of three dogs with proliferative otitis externa had middle ear lesions, mostly severe, and 14 of 26 dogs with proliferative otitis externa were French bulldogs. Overall, 22 of 25 ears (88%) in this breed group had middle ear disease. The middle ear changes which were observed in this breed were clearly different from those typically observed in brachycephalic dogs without otitis.¹³ Clinicians should pay special attention to otoscopy when examining French bulldogs, or when material is identified in the tympanic bulla during magnetic resonance imaging or CT prescribed for an unrelated neurological or obstructive airway condition, because chronic proliferative otitis may develop in this breed without major signs.^{13,20}

Different types of middle ear CT lesions were observed in this study: material-filled, thickened bulla walls and partial or total destruction of the bulla wall. Lesions were significantly more severe in dogs with proliferative otitis compare to other categories. The presence of bulla wall thickening may be considered as an irreversible feature and could be an indication for a total ear canal ablation and lateral bulla osteotomy (TECA-LBO).¹⁸ A limitation of this study was that measurement of the thickness of the tympanic cavity wall was not included as a parameter of comparison. A previous study reported that brachycephalic breeds have a thicker wall when compared with mesaticephalic dogs.¹³ In addition, it would have been relevant to systematically perform a myringotomy and cytological analysis of fluid present in the bulla to confirm its inflammatory basis.

Deafness in CKCS was identified in Group 3 as a specific entity. It was associated with fluid-filled bullae in all cases and was presumed to be due to primary secretory otitis media which is a sterile effusion in the tympanic cavity presumably secondary to a Eustachian tube dysfunction.^{21–23} The presence of material in the bulla may be considered as an incidental finding but can also be accompanied by deafness (conductive hearing loss) or with signs of pain involving the head and neck, and/or neurological signs, and therefore should be differentiated from syringomyelia.^{21,23}

In conclusion, this retrospective study demonstrated that otitis media was more frequently associated with chronic otitis externa alone than with vestibular disorders. The presence of material in the middle ear might be a perpetuating factor of otitis externa and a cause of therapeutic failure. This highlights the particular importance of recommending a tomographic examination when chronic otitis externa is suppurative or proliferative, because 45

and 68% of the middle ears were affected in those clinical situations, respectively. Furthermore, it was established that proliferative otitis, which often affects French bulldogs, is associated with advanced lesions of the tympanic bullae. In the absence of specific signs and because of the anatomical features of the middle ear, it is very difficult to confirm otitis media by direct examination. Computed tomography is an effective diagnostic technique that should be included in the investigative process of chronic otitis externa. Accurate assessment of the severity of middle ear lesions should help the practitioner in determining an appropriate management approach.

References

1. Shell LG. Otitis media and otitis interna. Etiology, diagnosis, and medical management. *Vet Clin North Am Small Anim Pract* 1988; 18: 885–899.
2. Bruyette DS, Lorenz MD. Otitis externa and otitis media: diagnostic and medical aspects. *Semin Vet Med Surg (Small Anim)* 1993; 8: 3–9.
3. Garosi LS, Lowrie ML, Swinbourne NF. Neurological manifestations of ear disease in dogs and cats. *Vet Clin North Am Small Anim Pract* 2012; 42: 1,143–1,160.
4. Gotthelf LN. Diagnosis and treatment of otitis media in dogs and cats. *Vet Clin North Am Small Anim Pract* 2004; 34: 469–487.
5. Cole LK, Kwochka KW, Kowalski JJ et al. Microbial flora and antimicrobial susceptibility patterns of isolated pathogens from the horizontal ear canal and middle ear in dogs with otitis media. *J Am Vet Med Assoc* 1998; 212: 534–538.
6. Little CJ, Lane JG, Gibbs C et al. Inflammatory middle ear disease of the dog: the clinical and pathological features of cholesteatoma, a complication of otitis media. *Vet Rec* 1991; 128: 319–322.
7. Hoskinson JJ. Imaging techniques in the diagnosis of middle ear disease. *Semin Vet Med Surg (Small Anim)* 1993; 8: 10–16.
8. Love NE, Kramer RW, Spodnick GJ et al. Radiographic and computed tomographic evaluation of otitis media in the dog. *Vet Radiol Ultrasound* 1995; 36: 375–379.
9. Classen J, Bruehschwein A, Meyer-Lindenberg A et al. Comparison of ultrasound imaging and video otoscopy with cross-sectional imaging for the diagnosis of canine otitis media. *Vet J* 2016; 217: 68–71.
10. Garosi LS, Dennis R, Schwarz T. Review of diagnostic imaging of ear diseases in the dog and cat. *Vet Radiol Ultrasound* 2003; 44: 137–146.
11. Rohleder JJ, Jones JC, Duncan RB et al. Comparative performance of radiography and computed tomography in the diagnosis of middle ear disease in 31 dogs. *Vet Radiol Ultrasound* 2006; 47: 45–52.
12. Foster A, Morandi F, May E. Prevalence of ear disease in dogs undergoing multidetector thin-slice computed tomography of the head. *Vet Radiol Ultrasound* 2015; 56: 18–24.
13. Salguero R, Herrtage M, Holmes M et al. Comparison between computed tomographic characteristics of the middle ear in non-brachycephalic and brachycephalic dogs with obstructive airway syndrome. *Vet Radiol Ultrasound* 2016; 57: 137–143.
14. Saridomichelakis MN, Farmaki R, Leontides LS et al. Aetiology of canine otitis externa: a retrospective study of 100 cases. *Vet Dermatol* 2007; 18: 341–347.
15. Garosi LS, Dennis R, Penderis J et al. Results of magnetic resonance imaging in dogs with vestibular disorders: 85 cases (1996–1999). *J Am Vet Med Assoc* 2001; 218: 385–391.
16. Kolaczowska E, Kubes P. Neutrophil recruitment and function in health and inflammation. *Nat Rev Immunol* 2013; 13: 159–175.
17. Brazil JC, Parkos CA. Pathobiology of neutrophil-epithelial interactions. *Immunol Rev* 2016; 273: 94–111.
18. Doyle RS, Skelly C, Bellenger CR. Surgical management of 43 cases of chronic otitis externa in the dog. *Ir Vet J* 2004; 57: 22–30.

19. Sula MJ. Tumors and tumorlike lesions of dog and cat ears. *Vet Clin North Am Small Anim Pract* 2012; 42: 1,161–1,178.
20. Owen MC, Lamb CR, Lu D et al. Material in the middle ear of dogs having magnetic resonance imaging for investigation of neurologic signs. *Vet Radiol Ultrasound* 2004; 45: 149–155.
21. Stern-Sertholtz W, Sjöström L, Härkanson NW et al. Primary secretory otitis media in the Cavalier King Charles spaniel: a review of 61 cases. *J Small Anim Pract* 2003; 44: 253–256.
22. Hayes GM, Friend EJ, Jeffery ND. Relationship between pharyngeal conformation and otitis media with effusion in Cavalier King Charles spaniels. *Vet Rec* 2010; 167: 55–58.
23. McGuinness SJ, Friend EJ, Knowler SP et al. Progression of otitis media with effusion in the Cavalier King Charles spaniel. *Vet Rec* 2013; 172: 315.

Supporting Information

Additional Supporting Information may be found in the online version of this article.

Table S1. Numbers of dog with ear disease by breed for each group.

Résumé

Contexte – La tomodensitométrie (CT) est considérée comme la méthode de référence pour évaluer l'atteinte des structures de l'oreille moyenne.

Objectifs – Évaluer la présence et la sévérité des changements de CT dans l'oreille moyenne et établir si des présentations cliniques spécifiques sont associées à une otite moyenne.

Sujets – Les données médicales des animaux référés pour CT avec anamnèse et signes cliniques compatibles avec une atteinte de l'oreille moyenne.

Méthodes – Il a été réalisé une évaluation rétrospective des examens CT des bulles tympaniques réalisés pendant six ans. Les données médicales ont été revues pour le signalement, les signes cliniques et l'évaluation cytologique du conduit auriculaire externe. Les chiens ont été répartis en trois groupes cliniques : otite externe chronique (groupe 1), trouble vestibulaire périphérique (groupe 2) et autres présentations cliniques (groupe 3).

Résultats – Groupe 1 – Sur 214 oreilles, 87 (40,7%) présentaient des anomalies au CT : 38 sur 87 (17,7%) avaient des bulles pleines, 42 sur 87 (19,6%) avaient des parois des bulles épaissies et sept sur 87 (3,2%) avaient une lyse des bulles. Les anomalies étaient significativement plus fréquentes chez les chiens atteints d'otite suppurée que d'otite érythémato-cérumineuse (respectivement 57% et 23%, $P = 0,003$). Une otite proliférative, particulièrement chez les bouledogues français, était associée à une otite moyenne sévère.

Groupe 2 – Sur les 106 oreilles, 91 (85,8%) avaient une bulle tympanique normale.

Groupe 3 – Sur les 26 oreilles de chiens sourds, 17 avaient des bulles pleines; tous les neuf chiens atteints étaient des Cavalier King Charles. Tous les chiens atteints de syndrome Claude Bernard Horner ou de tête penchée avaient des bulles tympaniques normales.

Signification clinique – Le CT est utile pour les otites externes canines, notamment pour les otites prolifératives ou suppurées, même en absence de signes neurologiques associés.

Resumen

Introducción – La tomografía computerizada (TC) se considera el método de referencia para evaluar las estructuras del oído medio.

Objetivos – Evaluar la presencia y gravedad de los cambios en la TC en el oído medio y establecer si alguna presentación clínica específica está asociada con otitis media.

Animales – Historiales clínicos de animales referidos para TC con antecedentes y signos clínicos consistentes con enfermedad del oído medio.

Métodos – Evaluación retrospectiva de los exámenes tomográficos de bulla timpánica realizados durante un período de seis años. Los historiales clínicos se revisaron para datos demográficos, signos clínicos y la evaluación citológica del conducto auditivo externo. Los perros se dividieron en tres grupos clínicos: otitis externa crónica (Grupo 1), trastorno vestibular periférico (Grupo 2) y otras presentaciones clínicas (Grupo 3).

Resultados – Grupo 1: De los 214 oídos 87 (40,7%) tuvieron anomalías en la TC: 38 de 87 (17,7%) tenían bullas llenas de material, 42 de 87 (19,6%) tenían paredes de bulla engrosadas y en siete de 87 (3,2%) había lisis de la bulla. Las anomalías fueron significativamente más frecuentes en los perros con otitis supurativa que en la otitis eritematosa-ceruminosa (57% y 23%, respectivamente, $P = 0,003$). La otitis proliferativa, particularmente en los Bulldogs Franceses, se asoció con otitis media severa.

Grupo 2 – De las 106 orejas, 91 (85,8%) tenían bulla timpánica normal.

Grupo 3 – De las 26 orejas de perros sordos, 17 tenían bullas llenas de contenido; los nueve perros afectados eran Cavalier King Charles Spaniel. Todos los perros con síndrome de Claude Bernard Horner o inclinación de la cabeza tenían bulla timpánica normal.

Importancia clínica – La TC es útil para la otitis externa crónica canina, particularmente en otitis supurativa o proliferativa, incluso en ausencia de signos neurológicos asociados.

Zusammenfassung

Hintergrund – Die Computertomografie (CT) wird als Referenzmethode zur Evaluierung der Mittelohrstrukturen betrachtet.

Ziele – Eine Evaluierung des Auftretens von Mittelohrveränderungen und deren Ausmaß sowie die Feststellung ob spezifische klinische Präsentationen mit einer Otitis media in Zusammenhang gebracht werden konnten.

Tiere – Die Krankengeschichten von Tieren mit einer Anamnese und klinischen Anzeichen einer Mittelohrkrankung, die zur CT überwiesen worden waren.

Methoden – Eine retrospektive Evaluierung von CT Untersuchungen der Bulla tympanica, welche über einen Verlauf von sechs Jahren durchgeführt worden waren. Die Krankengeschichten wurden auf Signalement, klinische Zeichen und zytologische Evaluierung des äußeren Ohrkanals durchgesehen. Die Hunde wurden in drei klinische Gruppen eingeteilt: chronische Otitis externa (Gruppe 1), peripheres Vestibulärsyndrom (Gruppe 2) oder andere klinische Präsentationen (Gruppe 3).

Ergebnisse – Gruppe 1 – von 214 Ohren zeigten 87 (40,7%) CT Abweichungen: 38 von 87 (17,7%) zeigten Bullae, die mit Material gefüllt waren, 42 von 87 (19,6%) zeigten verdickte Bullawände und sieben von 87 (3,2%) zeigten eine Lyse der Bulla. Die Abweichungen traten häufiger bei jenen Hunden mit einer suppurativen Otitis als bei Hunden mit einer erythematös-ceruminösen Otitis (57% bzw 23%; $P = 0,003$) auf. Die proliferative Otitis, vor allem bei der französischen Bulldogge wurde im Zusammenhang mit schwerer Otitis media gesehen.

Gruppe 2 – Von den 106 Ohren hatten 91 (85,8%) eine normale Bulla tympanica.

Gruppe 3 – Von den 26 Ohren von tauben Hunden zeigten 17 eine gefüllte Bulla; alle neun betroffenen Hunde waren Cavalier King Charles Spaniels. Alle Hunde mit Claude Bernard Horner Syndrom oder Schiefhalten des Kopfes zeigten eine normale Bulla tympanica.

Klinische Signifikanz – Die CT ist eine nützliche Methode, um eine chronische Otitis des Hundes, vor allem suppurative oder proliferative Otitiden, auch in der Abwesenheit von neurologischen Zeichen zu evaluieren.

要約

背景 – コンピュータ断層撮影法(CT)は、中耳構造を評価するための一般的な方法とされている。

目的 – CT画像における中耳の変化の有無および重症度を評価し、特定の臨床症状が中耳炎に関連しているかどうかを検討する。

供与動物 – 中耳炎と一致した病歴および臨床症状を有し、CT撮影のため紹介された患者の医療記録。

方法 – 6年間におよび鼓室胞CT撮影記録の回顧的評価。シグナルメント、臨床症状および細胞学的評価結果は診療記録より得た。犬は、慢性外耳炎(第1群)、末梢前庭障害(第2群)および他の臨床症状(第3群)の3つの臨床群に分類された。

結果 – 第1群 - 214の耳のうち、87例(40.7%)がCT異常所見を示した。87例中38例(17.7%)が何らかの物質で充満された鼓室胞を有し、87例中42例(19.6%)が鼓室胞壁の肥厚、87例中7例(3.2%)が鼓室胞の骨融解を呈していた。異常所見は、化膿性耳炎において紅斑性耳垢性耳炎よりも有意に高頻度に認められた(57%および23%; $P = 0.003$)。特に、フレンチブルドッグでは、重篤な中耳炎と関連していた。

第2群 - 106の耳のうち、91例(85.8%)は正常な鼓室胞を有していた。

第3群 - 失聴した26の耳のうち、17頭は何らかの物質で充満された鼓室胞を有し、罹患した9頭の犬はすべてキャバリア・キングチャールズ・スパニエルであった。クロードベルナルホルネル症候群または斜頸を有するすべての犬は、正常な鼓室胞を有していた。

臨床的重要性 – CTは、付随する神経学的徴候がなくても、特に化膿性または増殖性耳炎を有する犬の慢性外耳炎に有用である。

摘要

背景 – 计算机断层扫描(CT)是评估中耳结构的参考方法。

目标 – CT评估中耳是否存在变化以及严重性,并确定特定的临床表现是否与中耳炎有关。

动物 – 病历记录中病史和临床症状符合中耳疾病并转诊做CT的动物。

方法 – 回顾评估六年内进行的鼓膜CT检查。总结病征、临床症状和外耳道细胞学评估的病历记录。把犬分为三个临床组:慢性外耳炎(组1),外周前庭障碍(组2)和其他临床表现(组3)。

结果 – 第1组 – 214个耳道病例中,87例(40.7%)有CT异常:87例中有38例(占17.7%)鼓泡中有物质充盈,87例中有42例(19.6%)鼓泡壁增厚,87例中有7例(3.2%)鼓泡溶解。犬的鼓泡异常率,化脓性耳炎明显高于红斑-盯眵性耳炎(57%和23%, $P = 0.003$)。增生性耳炎,特别是法国斗牛犬,往往导致严重的中耳炎。

第2组 – 106个耳道病例中,91例(85.8%)具有正常鼓膜。

第3组 – 在失聪的26只犬的耳道中,17只鼓泡充盈:9只发病犬是骑士查理王小猎犬。所有发生伯-霍二氏综合征或歪头的犬,均鼓膜正常。

临床意义 – 即使没有相关神经症状,对于犬慢性外耳炎,特别是化脓性或增生性耳炎也建议使用CT诊断。

Resumo

Contexto – A tomografia computadorizada (TC) é considerada o método de referência para avaliar estruturas da orelha média.

Objetivos – Avaliar a presença e a severidade das alterações da orelha média na TC e estabelecer se alguma apresentação clínica específica está associada à otite média.

Animais – Prontuários de animais encaminhados para TC com histórico e sinais clínicos consistentes com otopatias da orelha média.

Métodos – Avaliação retrospectiva de exames de TC da bula timpânica realizados em um período de seis anos. Nos prontuários, revisou-se os sinais clínicos e a avaliação citológica do conduto auditivo externo. Os cães foram divididos em três grupos clínicos: otite externa crônica (Grupo 1), vestibulopatia periférica (Grupo 2) e outras apresentações clínicas (Grupo 3).

Resultados – Grupo 1 – Das 214 orelhas, 87 (40,7%) possuíam anormalidades na TC: 38 de 87 (17,7%) apresentavam a bula preenchida por material, 42 de 87 (19,6%) apresentavam as paredes da bula espessadas e sete de 87 (3,2%) apresentavam lise óssea da bula. As alterações foram significativamente mais frequentes em cães com otite supurativa que em otite eritemato-ceruminosa (57% e 23%, respectivamente; $P = 0.003$). As otites proliferativas, especialmente em bulldogues franceses, estavam associadas com otite média severa.

Grupo 2 – Das 106 orelhas, 91 (85,8%) possuíam bulas timpânicas normais.

Grupo 3 – Das 26 orelhas de cães surdos, 17 possuíam a bula preenchida; todos os nove cães afetados eram da raça Cavalier King Charles Spaniel. Todos os cães com síndrome de Claude Bernard Horner ou *head tilt* possuíam a membrana timpânica normal.

Significância clínica – A TC é particularmente útil na otite externa crônica canina, particularmente nos casos supurativos ou proliferativos, mesmo na ausência de sinais neurológicos associados.