Comparison between video otoscopy and advanced imaging techniques (computed tomography and magnetic resonance) in the diagnosis of otitis media in dogs with otitis externa

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June 2019

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INTRODUCTION

Otitis externa (OE) and otitis media (OM) are the inflammation of the external ear canal and the middle ear respectively, which are separated by the tympanic membrane. Chronic OE is considered the most common predisposing factor of OM.

Tympanic membrane can be examined with video otoscopy (VO), but the diagnosis of OM with this technique can be challenging because a normal tympanic membrane does not rule out middle ear disease.

The advanced imaging techniques, computed tomography (CT) and magnetic resonance (MR), allow to evaluate the tympanic bulla and see if there is content, main sign of OM.

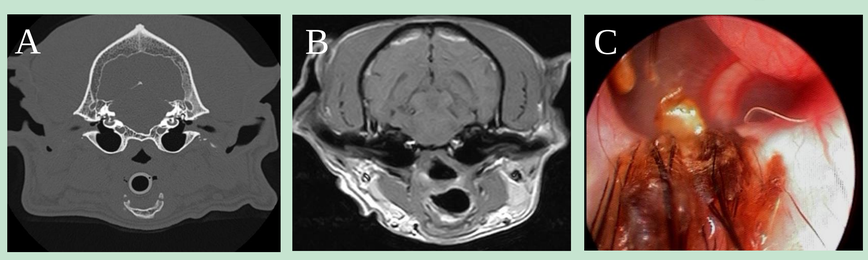

Figure 1. Normal appearance of the tympanic bulla in CT (A) and MR (B). Normal tympanic membrane in VO (C).

OBJECTIVE

Comparing the VO with the advanced imaging techniques for the diagnosis of OM in dogs with OE.

MATERIALS AND METHODS

- Animals: dogs with OE in which a VO and one advanced imaging technique were performed.
- Parameters evaluated with CT and MR: presence of material in the tympanic bulla, bulla wall thickening, ear canal cartilage mineralization and lymphadenomegaly.
- Parameters evaluated with VO: normal, ruptured, opaque or absent tympanic membrane; domed pars flacida; stenosis or mass in the ear canal.
- Data analysis: Fisher exact test and Pearson's chi-squared test (χ^2). A value of $p<0,05$ was used to define significance.

RESULTS

Animals: 49 (31 male, 18 female)
Ears: 82
Age: from 1 to 14 years (median: 6 years)
Brachycephalic dogs: 15 (30,6%)
OE:
- Erythematous-ceruminous: 40
- Suppurative: 42

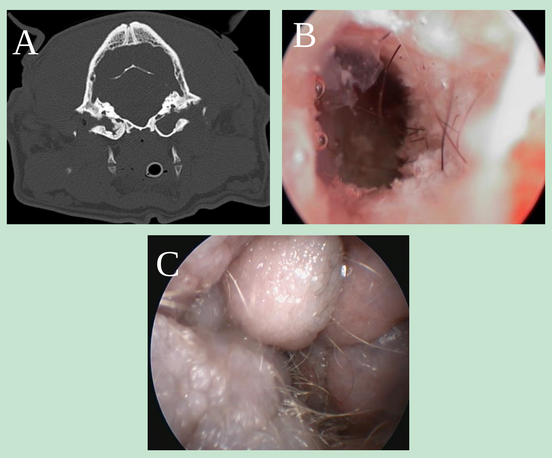

Figure 2. Content in tympanic bulla in CT (A), ruptured tympanic membrane (B) and stenosis of the external ear canal (C) in VO.

Table 1. Results obtained with CT and MR.

	COMPUTED TOMOGRAPHY / MAGNETIC RESONANCE			
	Content	**Increase in wall thickness**	**Mineralization**	**Lymphadenomegaly**
Ears	25 (30%)	11 (13%)	35 (43%)	34 (41%)

Table 2. Results obtained with VO.

	VIDEO OTOSCOPY						
	Visible tympanic membrane				Not visible tympanic membrane		
	Normal	**Domed pars flacida**	**Opaque**	**Ruptured**	**Stenosis**	**Absent**	**Mass**
Ears	36 (44%)	3 (3,8%)	4 (4,9%)	3 (3,8%)	30 (36%)	4 (4,9%)	2 (2,6%)

Table 3. Comparison between CT/MR and VO.

			OTITITS MEDIA DIAGNOSIS	
			With content in CT/MR	**Without content in CT/MR**
Video otoscopy	**Visible TM**	Normal	6	0
		Domed	2	0
		Opaque	2	0
		Ruptured	0	3
	Not visible TM	Stenosis	11	0
		Absent	2	2
		Mass	2	0
		Total	25	5

Table 4. Data analisis results.

DATA ANALYSIS	p value
Pearson's chi-squared test ($\chi 2$)	
Erythematous-ceruminous or suppurative OE	0,56
Content and lymphadenomegaly	0,001
Content and mineralization	0,42
Brachycephalic breeds and stenosis	0,0002
Brachycephalic breeds and content	0,0004
OM diagnosis with VO or CT/MR	0,0004
Fisher exact test	
Content and increase in wall thickness	0,007

CONCLUSIONS

- OE is a predisposing factor of OM independently of the type of OE.
- Brachycephalic dogs are more predisposed to present stenosis of the external ear canal and accumulation of content in middle ear.
- Lymphadenomegaly and thickness of the tympanic bulla wall are present more frequently in animals with OM.
- Ruptured or absent tympanic membranes without signs of OM in CT and MR can be due to a very small amount of content in the bulla, to a hyper acute rupture of the tympanic membrane or an iatrogenic rupture of the membrane during the VO.
- Advanced imaging techniques CT and MR are better than video otoscopy in the diagnosis of OM.
- The principal limitation of VO is the stenosis of the external ear canal.