Case Report Rapport de cas

Cholesterol granuloma associated with otitis media and leptomeningitis in a cat due to a *Streptococcus canis* infection

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Abstract — Cholesterol granuloma in the middle ear is a pathological condition often associated with otitis media in humans. Cholesterol granulomas in cats are rarely described. To our knowledge, this is the first report of middle ear cholesterol granuloma in a cat, associated with otitis media and leptomeningitis due to a *Streptococcus canis* septicemia.

Résumé — Granulome à cholestérol associé à une otite moyenne et à une leptoméningite chez un chat causé par une infection par *Streptococcus canis*. Un granulome à cholestérol dans l'oreille moyenne est une affection pathologique souvent associée à l'otite moyenne chez les humains. Les granulomes à cholestérol chez les chats sont rarement décrits. À notre connaissance, il s'agit du premier rapport d'un granulome à cholestérol de l'oreille moyenne chez un chat, associé à l'otite moyenne et à la letpoméningite, causé par une septicémie à *Streptococcus canis.*

(Traduit par Isabelle Vallières)

Can Vet J 2013;54:72–73

Cholesterol granulomas are non-neoplastic lesions with characteristics of a granuloma, containing cholesterol crystals (1). Factors necessary for the development of cholesterol granuloma are hemorrhage, interference with clearance or drainage, and obstruction of air exchange or ventilation (1). Middle ear cholesterol granuloma is a pathological condition often associated with otitis media in humans (1). In veterinary medicine, cholesterol granulomas are seen in the choroid plexus (plexus cholesteatoma) of the ventricles in 20% of older horses as an asymptomatic aging change and incidental finding on necropsy (2). In dogs, cholesterol granulomas are only rarely found in the middle ear, the maxilla, and the brain (3–5) and have recently been associated with otitis media (6). Cholesterol granulomas in cats are rarely described in the uterus (7) and brain (8,9).

To our knowledge, this is the first report of a case of middle ear cholesterol granuloma in a cat, which was associated with a *Streptococcus canis* septicemia, leptomeningitis, and otitis media.

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Presented as a poster at the ESVP/ECVP Congress, Uppsala, Sweden, September 2011.

Case description

A stray, adult, black female domestic long-haired cat was found with signs of cachexia, moaning when manipulated, apathy, depression and weakness, circling and ataxia. Due to poor health status the cat was euthanized.

On postmortem examination, the animal was cachectic and dehydrated with an unhealthy coat. Both external ears were dirty with thick brown granular material in the ears and the right bulla tympanic wall was wet, with thickening and white foci. The gross appearance of the brain, meninges, and left tympanic bulla was normal. Samples of the right bulla tympanic wall, the cerebrum, cerebellum and brainstem, liver, and spleen were collected for bacteriological and histopathological examination.

Samples for histopathology were fixed in neutral-buffered formalin, embedded in paraffin wax, sectioned (5 μm) and stained with hematoxylin and eosin (H&E). Histological examination of the right bulla wall demonstrated predominantly fibrovascular tissue with some areas of ossification. Multiple acicular empty clefts typical for cholesterol crystals were present, surrounded by aggregates of foamy macrophages. Lymphocytes, plasma cells, and some neutrophils were also present. The granulation tissue was partially covered by flattened, simple squamous epithelium. The leptomeninges of the cerebrum showed some infiltrating mononuclear inflammatory cells, while there was no meningitis at the level of the brain stem and cerebellum. Histopathological

lesions were absent in the brain parenchyma. Bacteriological examination revealed the presence of β-haemolytic colonies on blood agar plates (BioMérieux, Brussels, Belgium) and selective Gram-positive plates (colistin aztreonam plates, CAP, Oxoid, Erembodegem — Aalst, Belgium) in all tissue samples. The bacterium was identified as *Streptococcus canis* by tDNA-polymerase chain reaction (PCR) (10).

Discussion

Streptococcus canis can belong to the normal flora of the perianal region, oral cavity, and upper respiratory tract and has been associated with pyogenic infections of the respiratory tract, skin, genitourinary system, eyes, bones, and cardiovascular system of dogs and cats (11–13). Outbreaks with fatal infections have been reported in intensively housed shelter cats (14) and breeding colonies (15).

Otitis media, inflammation of the middle ear structures, can be initiated via rupture of the tympanic membrane (most common), through the auditory tube or rarely by hematogenous spread (16). Cats may develop otitis media, similar to piglets (17), through the auditory tube secondary to upper respiratory disease (18). Spread of infection from the middle and inner ear to the brain may occur by erosion through the medial aspect of the petrous temporal bone, by migration of bacteria along existing vascular or neuronal pathways, or via hematogenous spread, and can result in meningitis, encephalitis, or abscess formation (19). Although considered uncommon, central nervous system invasion as a complication of otitis media has been demonstrated in animals (19,20).

It is generally agreed that most cases of otitis in veterinary patients are caused by bacteria, of which *Staphylococcus* and *Streptococcus* spp. are among the most commonly isolated (16,21). All organ samples showed presence of *S. canis* and hematogenous spread is assumed. To the authors' knowledge, this is the first report of middle ear cholesterol granuloma in a cat, associated with otitis media and leptomeningitis due to a *S. canis* septicemia.

Acknowledgments

We thank the staff of the Pathology and Bacteriology (VAR) section for technical assistance. CVJ

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