

Disease Conditions in Cats and Dogs Diagnosed at the Post-Mortem Laboratory of the Faculty of Veterinary Medicine, Universiti Putra Malaysia between 2005 and 2015

Rathiyaler, M., Zamri-Saad, M. and Annas, S.*

Department of Veterinary Laboratory Diagnosis, Faculty of Veterinary Medicine, Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor, Malaysia

ABSTRACT

Keeping pets is a growing trend in Malaysia. This retrospective study involves data analysis of cases of dogs and cats submitted to the Post-Mortem Laboratory, Faculty of Veterinary Medicine, Universiti Putra Malaysia between 2005 and 2015. A total of 37 disease conditions were diagnosed among dogs with septicaemia (10.2%), mammary gland tumor (8.4%) and canine distemper (7.9%) were significantly ($p < 0.05$) more frequently diagnosed. In cats, a total of 27 disease conditions were diagnosed with traumatic injuries (19.5%), feline infectious peritonitis (15.1%) and sporotrichosis (12%) were significantly ($p < 0.05$) more frequent. Poor awareness among pet owners towards the health requirements of their pets is a main reason for the above.

Keywords: Post-mortem, common, health problems, diseases, dogs, cats

INTRODUCTION

Keeping pets such as dogs, cats, fish, reptiles and birds has become a growing trend

worldwide making the death of pet animals an important issue. One of the ways to identify the cause of death of pet animals is by post-mortem examination (Weber et al., 2008). This method of examination provides an opportunity to undertake a thorough examination of dead animals (Berglund et al., 2003).

There are limited studies on the common health problems and their associated pathological changes in cats and dogs. This study was designed to identify the common health problems

ARTICLE INFO

Article history:

Received: 12 January 2017

Accepted: 29 March 2017

E-mail addresses:

mrathiyaler@gmail.com (Rathiyaler, M.),

mzamri@upm.edu.my (Zamri-Saad, M.),

annas@upm.edu.my (Annas, S.)

* Corresponding author

based on pathological examinations on local dogs and cats presented to the Post-Mortem Laboratory, Faculty of Veterinary Medicine, Universiti Putra Malaysia (UPM). This study also describes the pathological changes associated with the common health problems observed in cats and dogs.

MATERIALS AND METHODS

Data Collection

Case records at the Post-Mortem Laboratory, Faculty of Veterinary Medicine, Universiti Putra Malaysia between 2005 and 2015 were selected. These included the records of necropsy, biopsy and disposal cases involving dogs and cats. Only those cases with a confirmatory diagnosis were included in this study. Details on the identity, age, history, and clinical health history that lead to death, the gross lesions, histological changes and associated laboratory results were analysed.

Data Analysis

The data was analysed using Statistical Packages for the Social Sciences (SPSS) version 22. The data was categorical and non-continuous, thus non-parametric test was used in data analysis. All tests were done at 95% confidence interval level. Subsequently, Pearson's chi-square test was used to determine the occurrence rate of all diseases and to identify the prevalence of the three most common diseases in both dogs and cats.

Histopathology

Following analysis of the records, the three most common diseases in dogs and cats were identified. Ten representative cases for each of the three common diseases of dogs and ten common diseases of cats were randomly selected. Paraffin blocks were collected from the Histopathology Laboratory, Faculty of Veterinary Medicine, Universiti Putra Malaysia and were subjected to routine histopathology slide preparation. The blocks were sectioned at 4 µm using a microtome (Reichert-Jung 2045 Multicut Rotary Microtome, Canada) and were then subjected to routine staining using Harris' Haematoxylin and Eosin (H&E).

All tissue sections were viewed with the Olympus CX31 upright microscope which was attached to Olympus U-CAM3 and Hpx2301 monitor. The associated histopathological changes were identified and described for each disease. Gross lesions were noted following analyses of records.

RESULTS

Disease Prevalence among Dogs

A total of 762 cases among dogs were selected and subjected to data analysis. A total of 35 diagnoses were made (Figure 1). The three most common health problems among dogs were septicaemia (10.2%), mammary gland tumor (8.4%) and canine distemper (7.9%). They were diagnosed significantly ($p < 0.001$) more frequent than the remaining 32 diseases among dogs (Figure 1).

Gram-negative bacteria were the most common cause of septicaemia (66%), followed by a mixture of Gram-positive and Gram-negative (15%), while Gram-positive bacteria were involved in only 1% of the septicaemic cases of dogs. The involvement of Gram-negative bacteria in canine septicaemia was significantly ($p < 0.01$) higher than Gram-positive bacteria.

The common gross and histopathological lesions that were observed in cases of septicemia were multiple organ congestion including the spleen, liver, lungs (Figure 2(a)), kidney and gastrointestinal tract. Haemorrhagic spleen and haemorrhagic suppurative gastroenteritis (Figure 2(b)) were also reported.

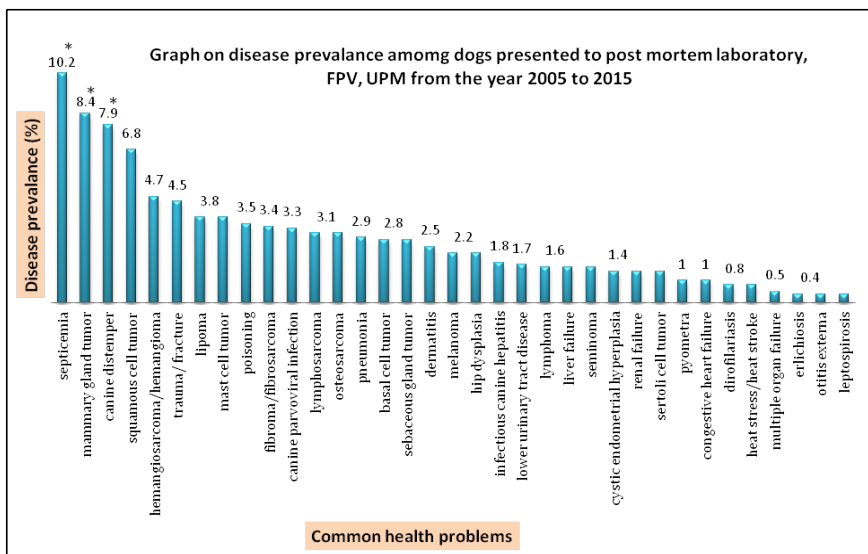


Figure 1. Prevalence of disease and health problems among dogs presented to the Post-mortem Laboratory between 2005 and 2015. Chi-square test, $X^2 (34, N=762) = 513.552$. *indicates significant difference at $p < 0.001$

A total of 64 cases for dogs were diagnosed as mammary gland tumor. The most common type was the mammary gland carcinoma accounting for 37 cases (57.8%), followed by 3 cases (4.7%) of mammary gland adenoma, and a case (1.6%) of mammary gland adenosarcoma. However, a total of 23 cases (35.9%) were unclassified. Thus, the mammary gland carcinoma was significantly more common than other types of canine mammary gland tumours [$X^2 (3,$

$N=64) = 73.6, p < 0.05$]. Among the 64 cases of mammary gland tumour, 78.1% ($n=50$) involved intact dogs and 84% ($n=42$) of these intact dogs were above 4 years old.

The common gross lesion observed in mammary gland tumour was the presence of masses at the ventral abdomen, which was observed in 58 cases (90.6%) while the remaining 6 cases (9.8%) were from biopsy cases with incomplete reports. On the other hand, histopathological examination

revealed the loss of tubular structure of the mammary gland (Figure 2(c)) and the presence of pleomorphic cells. In mammary gland adenoma, the lesions included loss of myoepithelium of the mammary gland (Figure 2(d)).

There was a total of 60 (7.9%) canine distemper cases. Among these, 91.7% (n=55) involved young dogs of less than 1 year old. The common lesion in canine distemper included cephalic congestion

with malacia, oedema and anoxic neurons (Figure 2(e)). Pulmonary congestion and oedema (Figure 2(f)), and mucosal petechiation of the gastrointestinal tract were frequently reported. Hyperkeratosis of the nose and footpads were also noticed. Based on the provided history, many of these dogs experienced central nervous system manifestation such as ataxic gait and depression.

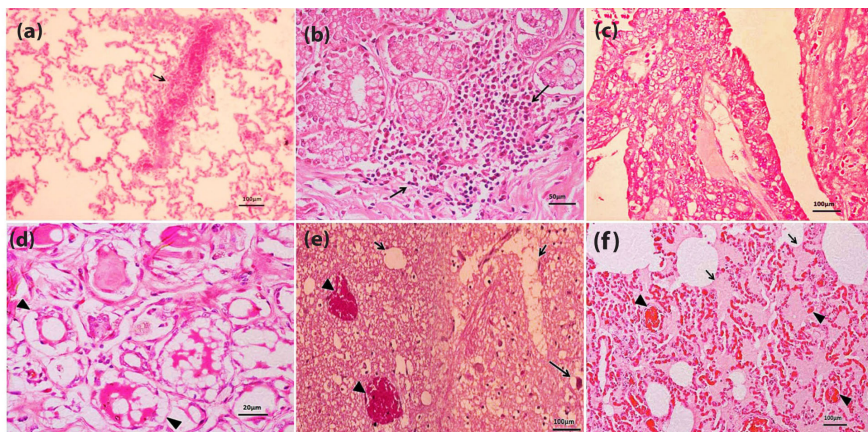


Figure 2. (a) Severe pulmonary congestion of a blood vessel (arrow) and interalveolar capillaries (H&E, 100x magnification, bar = 100 μ m). (b) Suppurative gastritis with mixture of macrophages and neutrophils (arrows) in the mucosa of stomach (H&E, 400x magnification, bar = 50 μ m). (c) Mammary gland carcinoma showing complete loss of tubular structures (H&E, 100x magnification, bar = 100 μ m). (d) Loss of myoepithelial surrounding the mammary gland tubules (arrowheads) (H&E, 400x magnification, bar = 20 μ m). (e) Severe congestion of the brain (arrowheads), accompanied by generalised mild to moderate spongiosis (short arrow) and anoxic neuron (long arrow) (H&E, 100x magnification, bar = 100 μ m). (f) Severe pulmonary oedema with generalised pulmonary congestion (arrowheads) and thickening of interalveolar septa (arrow). (H&E, 100x magnification, bar = 100 μ m)

Disease Prevalence among Cats

A total of 866 cases among cats were analysed, resulting in 27 health problems being diagnosed (Figure 3). The three most common health problems among cats were traumatic injury (19.5%), feline infectious peritonitis (FIP) (15.0%) and sporotrichosis

(12%). They were diagnosed more frequently ($p<0.001$) than the remaining 24 diseases (Figure 3).

Road traffic accidents appeared to be the most frequent cause of traumatic injuries (96 cases, 56.8%), followed by the high-rise syndrome (39 cases, 23.1%), blunt object

trauma (15 cases, 8.9%) and fighting (10 cases, 5.9%). Traumatic injuries of unknown cause involved 9 cases (5.3%). The road traffic accident was significantly high among the traumatic injury of cats [$X^2(4, N=169) = 200.8, p<0.05$]. The gross lesions observed in traumatic injuries included spinal injury with transected spinal, head trauma with brain haemorrhages, multiple fractures, herniation, haemoabdomen, haemothorax and contusion. Histopathological examination was done in cases of traumatic injury.

The second most common health problem among cats was feline infectious peritonitis (130 cases; 15%). It appeared that effusive FIP was more frequently observed (90 cases, 69.2%) followed by the dry form (28 cases, 21.5%) and the mixed form (13 cases, 10.0%). The effusive form was significantly more frequent compared

with the other two forms [$X^2(2, N= 131) = 114.5, p<0.01$]. Among the affected cats with effusive form, 75.6% ($n=68$) involved cats between 4 months and 2 years old.

The effusive form of FIP resulted in ascites, hydrothorax and thickening of the wall of small intestine with hemorrhagic mucosa. Histopathology revealed pulmonary vasculitis (Figure 4(a)) and focal pulmonary necrosis (Figure 4(b)). The non-effusive form showed pulmonary and hepatic pyogranuloma. The affected liver was firm with fibrins adhesion. Congestive non-suppurative meningitis (Figure 4(c)) and hydropericardium were also observed. On the other hand, the mixed form involved combination of both effusive and non-effusive forms. The frequently observed lesions were ascites and multifocal diffuse pyogranuloma in multiple organs.

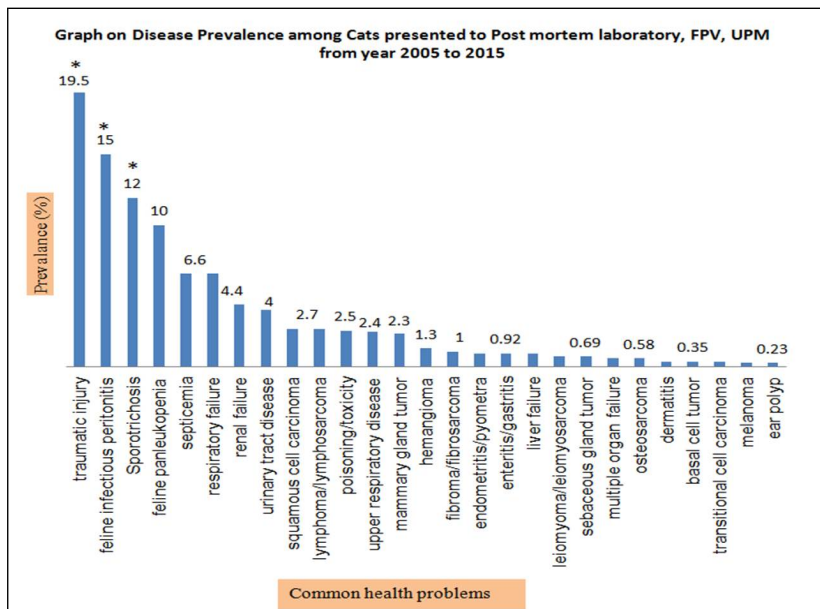


Figure 3. Graph on disease prevalence among cats presented to Post-mortem Laboratory, Faculty of Veterinary Medicine, UPM between 2005-2015. Chi-square test, $X^2(26, N=866) = 1150.1$. * indicates significant difference at $p<0.001$

Sporotrichosis was the third most frequent health problems among cats with reported 104 cases (12%). The common lesion observed in the affected cats was the

non-healing wound. Histology revealed the presence of spores either freely or within the macrophages within the non-healing wounds (Figure 4(d)).

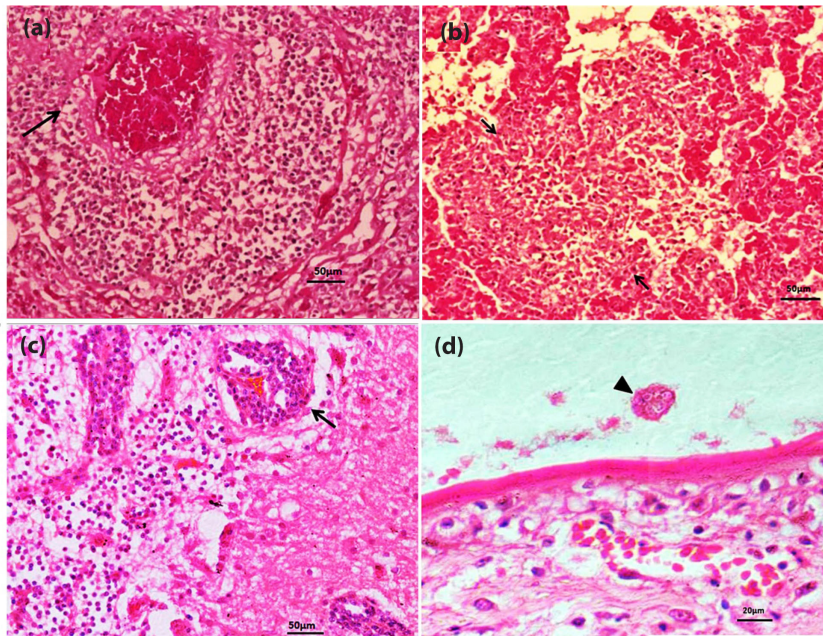


Figure 4. (a) Pulmonary vasculitis (arrows) and pulmonary congestion in effusive FIP (H&E, 400x magnification, bar= 50 µm). (b) Pulmonary focal necrosis (arrows) (H&E, 400x magnification, bar = 50 µm). (c) Histopathological section of the brain showing numerous infiltrations of inflammatory cells mostly neutrophils indicating suppurative meningitis and vasculitis (arrow) (H&E, 400x magnification, bar = 50 µm). (d) Non-healing wound showing spores of *Sporotrix schenckii* (arrowhead) within a macrophage (H&E, 1000x magnification, bar = 20 µm).

DISCUSSION

In this study, septicaemia is the most common health problem among dogs and the fifth most common for cats. This is in agreement with previous reports (Koenig, 2011; Ramachandran 2014). Bacteriological culture revealed frequent involvement of Gram-negative bacteria, as previously report by Svanbom (1979). The Gram-negative

bacteria produce potent endotoxins, leading to dilation of blood vessels in various organs and eventually sepsis (Ramachandran, 2014). Similarly, septicaemia is among the important diseases that cause death in humans (Bone et al., 1997).

Most cases of septicaemia reported in this study revealed inflammatory reaction in the mucosa of either stomach

or small intestinal. This indicates that most septicaemic cases in dogs originated from the gastrointestinal tract (Deitch et al., 1987). In veterinary practice, animals are generally administered with antibiotics to prevent and treat septicaemia, causing lysis of the Gram-negative bacteria and the release of high amount of endotoxin, leading to death caused by endotoxin shock (Remick, 2007; Ramachandran, 2014). Septicemia can also originate from external injuries such as contaminated fight wound or cuts and also pyothorax, peritonitis, pneumonia or ulcerative gastritis (Lefort et al., 2011)

An earlier study reported that mammary gland tumour was the most common tumour in female dogs (Brigitte et al., 2012). This study supported those findings and found the high prevalence of mammary gland tumour among dogs in Malaysia was possibly due to low awareness on the importance of neutering pets.

Canine distemper occurs among dogs that have been not properly vaccinated (Frolich, 2002). Chung et al. (2011) concluded that the main histopathology lesions are lymphoid depletion in the spleen and thymus atrophy, which was not observed in this present study. Greene and Appel (2006) concluded that most cases of canine distemper show acute non-inflammatory lesion in the brain in the form of spongy vacuolation, as observed in this study. Hyperkeratosis of nose and digits is commonly seen in dogs with central nervous signs of delayed response to infection (Greene and Appel, 2006; Martella

et al., 2008) was also reported in this study. Vaccination against canine distemper is categorised as vital suggesting the high prevalence of the disease in Malaysia was possibly the result of lack of vaccination of pets.

Traumatic injury is the most common cause of death among cats compared with dogs. Intact and out-door cats are prone to traumatic injuries (Rochlitz et al., 2004) caused by road traffic accident (Rochlitz et al., 2004) and the USA (Kolata, 1980).

FIP in many parts of the world (Foley et al, 1997) is due to the absence of effective vaccine (Fehr et al., 1997) and availability of effective treatment regimen (Hartmann & Ritz, 2008).

It is interesting to note that sporotrichosis is one of the most common diseases among cats which leads to systemic infection (Barros et al., 2011) and their prolonged treatment with antifungal drugs (Gremiao et al., 2015). Furthermore, its zoonotic potential leads to most owners opting to euthanise the infected pets.

CONCLUSIONS

The most common health problems among dogs are septicemia, mammary gland tumor and canine distemper. On the other hand, traumatic injuries, FIP and sporotrichosis occurred more frequently in cats, which may be prevented through pet vaccinations.

ACKNOWLEDGMENTS

The authors would like to thank all the staffs of Post-mortem and Histopathology

Laboratories, Faculty of Veterinary Medicine, UPM who helped in the project, particularly Mr. Ghazali Yusoff, Mr. Mohd Najib and Mrs. Latifah Hannan.

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