J. Comp. Path. 2017, Vol. ■, 1–18

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SPONTANEOUSLY ARISING DISEASE

Comparison of Clinical and Pathological Diagnoses in Cats and Dogs

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Summary

The comparison of clinical ante-mortem and pathological post-mortem diagnoses is a prerequisite for quality control, but is rarely done in veterinary medicine. This study reports the occurrence and concurrence of clinical and pathological diagnoses linked to death in 1,000 cats and 1,000 dogs examined and subjected to necropsy examination at the University of Zurich, Switzerland. Potential factors influencing the correlation between diagnoses were examined retrospectively. In 5.8% of cats and 5.2% of dogs no diagnosis was made; in 2.6% and 3.8% of cases only a clinical, and in 17.8% and 11.2%, respectively, only a pathological diagnosis was available. Of the 73.8% of cats and 79.8% of dogs with both diagnoses present, 38.3% and 36.2% were in agreement, while there was disagreement in 17.9% and 16.0%, respectively. The remaining cases (43.8% and 47.8%) had different levels of further diagnostic procedures following necropsy examination. In both species, the manner of death, the clinical discipline submitting the animal for necropsy examination and the quality of the necropsy submission request, as well as the timespan between death and necropsy examination in dogs, proved to influence the concurrence between diagnoses. In contrast, the organ system affected and the type of disease entity were, for both species, the most influential factors in the concurrence of diagnoses. Therefore, in veterinary medicine, even in times of improving diagnostic abilities, necropsy examination still reveals important information for quality control and education.

Keywords: cat; dog; post-mortem diagnosis

Introduction

Throughout the development of medical science, autopsy has been an important tool in determining cause of death, evaluating incompletely understood disorders, establishing pathogenesis, discovering new diseases and evaluating the effectiveness of a new therapy, as well as in medical education (Hazard, 1965). In human medicine the value of autopsy is still widely accepted, although between 1960 and 1980 critical voices were raised (Hazard, 1965; Holler and De Morgan, 1970; Burrows, 1975; Robinson, 1976) and the rules of implementation differ between countries. Roberts (1978) summarized 58 papers to attest the value and importance of autopsy, and some 20 years later, laymen (Start *et al.*, 1995), pathologists (Stubbs *et al.*, 1992; Start *et al.*, 1994), medical students (Botega *et al.*, 1997) and physicians (Berlin *et al.*, 1994) all agreed on the benefits of autopsies. Autopsy remains a vital tool in gaining knowledge about diseases (Gall, 1968; Karunaratne and Benbow, 1997; Burton and Underwood, 2007) and is a teaching tool in education (Burton and Underwood, 2007) as well as a tool contributing to quality monitoring (Zarbo *et al.*, 1999; Bayer-Garner *et al.*, 2002).

Medical general practitioners indicate that autopsy results do indeed modify their future clinical practice

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0021-9975/$ - see front matter

http://dx.doi.org/10.1016/j.jcpa.2017.01.004

Please cite this article in press as: Schertenleib TI, et al., Comparison of Clinical and Pathological Diagnoses in Cats and Dogs, Journal of Comparative Pathology (2017), http://dx.doi.org/10.1016/j.jcpa.2017.01.004

(Karunaratne and Benbow, 1997), and for epidemiological purposes autopsy gives precise information about the causes of death and contributes to an accurate monitoring of disease prevalence (Shojania *et al.*, 2003). In veterinary medicine, too, post-mortem examination is considered to be a crucial part of quality monitoring and education (Kent *et al.*, 2004; Vos *et al.*, 2005). In order to obtain the utmost from post-mortem examinations, clinical and pathological diagnoses must be compared (Anderson *et al.*, 1989, 1990; Zarbo *et al.*, 1999), followed by an analysis of the causes of any discrepancies (Tsujimura *et al.*, 1999). However, it should be kept in mind that autopsy is not a method for assessing the overall quality of medical care (Hill and Anderson, 1993) and that autopsy itself has limitations; clearly it excludes all cases in which the patient recovers (Anderson *et al.*, 1990). Furthermore, approximately 4–8% of autopsies will not reveal a decisive explanation of a patient's clinical symptoms (Bosman, 1990) and the complex processes of gross and microscopical observations and data interpretation may be subject to error (Anderson *et al.*, 1989; Saracci, 1991). Although the scope of autopsy examination as an assessment tool has its limitations, within these limits it remains very powerful (Hill and Anderson, 1993). When correctly exploited, autopsy records serve to identify systematic errors in diagnostic processes (Anderson *et al.*, 1990).

It is therefore surprising that in human medicine autopsy rates have declined dramatically over the last few decades (Burton and Nemetz, 2000) and are still falling in the 21st century (Roulson *et al.*, 2005; Pompilio and Vieira, 2008). In the USA, overall autopsy rates declined from approximately 19% in the 1970s to 8% in 2003 (Nemetz *et al.*, 2006). Looking at autopsies of hospital deaths only, the decline was from 30–40% before 1970 to <10% in 2005. While national averages reflect high autopsy rates at some hospitals, at the majority of non-academic institutions few or no autopsies are ever performed (Burton and Nemetz, 2000; Shojania and Burton, 2008). The same tendency is seen in Australia and Europe (Goldman *et al.*, 1983; Kirch and Schafii, 1996; Chariot *et al.*, 2000; Davies *et al.*, 2004).

In 1978, Roberts and, thirty years later, Toth (2010) listed nearly the same reasons for this trend, including loss in communication between disciplines and law regulations, citing medical staff, pathologists, relatives and hospital management. Physicians and surgeons might think that an autopsy will not provide any more information than has already been found thanks to new diagnostic techniques (Goldman *et al.*, 1983; Pompilio and Vieira, 2008; Thurnheer *et al.*, 2009). However, confidence in a clinical diagnosis is not sufficient assurance of its accuracy and it is impossible to predict whether unexpected findings will arise in an autopsy (Cameron and McGoogan, 1981a; Kirch and Schafii, 1996; Podbregar *et al.*, 2001). Despite advances in modern medicine, autopsy remains the gold standard for diagnosis (Gutierrez *et al.*, 2009), although pathologists struggle with the lack of recognition that the autopsy sometimes receives and autopsies may be delegated to the pathologist-in-training (Roberts, 1978; Goldman *et al.*, 1983; Bayer-Garner *et al.*, 2002; Van den Tweel, 2008; Toth, 2010).

Inadequate or delayed communication between clinicians and pathologists, fear of a mistake being discovered through an autopsy and possible subsequent malpractice prosecution contribute to clinicians' reluctance to request autopsy examination (Goldman *et al.*, 1983; Ackerman *et al.*, 2001), even if no increased litigation has been related to high autopsy rates (Shojania and Burton, 2008). Furthermore, the desire not to upset the bereaved family and all the necessary red tape may restrain physicians from requesting consent for an autopsy (Davies *et al.*, 2004).

The desire among laypersons to leave the body intact and to bury the dead promptly also contribute to families' reluctance to consent to autopsies because of the delay caused by the procedure (Sanner, 1994; Gutierrez *et al.*, 2009). Furthermore, organ retention scandals have partly diminished public trust in pathology (Burton and Wells, 2001).

Last but not least, financial constraints and the suspension of minimum autopsy percentages both contribute to the decline in autopsy rates (Burton, 2002).

In 2003, a comprehensive literature review showed that the rate of diagnostic errors remained high. The median error rate for misdiagnoses likely to have affected the outcome for the patient was 9% (range 0–20.7%), and for those involving a principal underlying disease or primary cause of death, it was 23.5% (range 4.1–49.8%; Shojania *et al.*, 2003). A second review in 2005 reported discrepant major diagnoses in 15–41% of cases. Moreover, it revealed at least one clinically unsuspected finding from autopsy in 45–76.5% of the cases (Roulson *et al.*, 2005). More current studies report major discrepancy rates between 6.0% and 17.2% (Maris *et al.*, 2007; Saad *et al.*, 2007; Kotovicz *et al.*, 2008; Tavora *et al.*, 2008; Tejerina *et al.*, 2012). Most individual studies do not show any significant reduction in discrepancy rates (Goldman *et al.*, 1983; Anderson *et al.*, 1989; Veress and Alafuzoff, 1993; Kirch and Schafii, 1996; Roulson *et al.*, 2005; Tejerina *et al.*, 2012). This persists even though a large number of new diagnostic techniques have been introduced over the

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