



### Editor's Viewpoint

## Forensic Veterinary Pathology: Old Dog Learns a Trick

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### Abstract

Veterinary pathology specialists deal with a wide range of challenges in order to practice and provide useful results from analyzing deceased animals. The large number of species is certainly a first step that makes education in Veterinary Pathology so exciting. Knowing animal diseases is the basis of what we understand from comparative pathology and its contribution to public and environmental health. Recently a new search for veterinary pathology work is asked in situations that death of animals is linked to crime, or a crime scene investigation is taking place. Law Enforcement asks for Expert Witness Testimony to analyze cause of death of one, or even several animals that can be involved in a crime scene investigation. Different from a routine necropsy, forensic necropsies usually have medico-legal interest and this changes completely the scenario. For this purpose, postmortem examination requires additional and rigorous documentation of all steps taken from the crime scene, gross and microscopically detected lesions in the bodies and collected samples that will be analyzed in special laboratories. Criminal actions in which animals might be involved, either as a victim, a testimony or a perpetrator need a correct interpretation.

### Introduction

It is not new that veterinarians are asked by Law Enforcement and Justice to perform Expert Criminal Analysis. But over the past decade, there has been a discernible growth in the literature on veterinary forensic pathology (1-3,7-9,11). Although few data is available, a lot to do is remarkable in this emerging and fascinating field of action for veterinary pathologists. The intense demand by societal needs in solving crimes involving animals is pushing research and credibility to forensic veterinary medicine, especially forensic veterinary pathology. Much of the knowledge is based on human literature, and comparative studies are needed to contribute to correct interpretation of alterations found in animals. Even terminology is a challenge while describing lesions in animals. Expert Witness Report (EWR) should avoid misuse of terms from human counterparts that do not apply to an animal (9,11). Studies estimating the number of cruelty cases show that it is an important cause of death of

animals (1,3,4,7,8), and many cases of medico-legal questions are involved (7,8). Data from a Canadian veterinary diagnostic laboratory indicates that medico-legal pathology cases have increased significantly from 1998 to 2011, particularly criminal cases of animal abuse or neglect of companion animals (8). Except for the equine regulatory cases, companion and non-companion animals were submitted as criminal, insurance, litigation, malpractice cases, and anesthetic-related deaths to this animal pathology laboratory. In Brazil this scenario is similar in terms of increasing number of medico-legal cases during the last decade. Very recently our group published a retrospective study of animal cruelty cases submitted to the animal pathology service at the São Paulo State University and to the Institute of Criminal Investigation of State Police of São Paulo, Brazil (7). This study concluded that cats are more susceptible to suffer cruelty acts than dogs. Also that there is no difference regarding sex, but age is a determining factor for young animals are more prone to be maltreated. The most

common situation is intentional poisoning by carbamate. This was well documented in a retrospective study of necropsies of 644 domestic cats, in which 191 cases (29.66%) presented lesions highly suggestive of animal cruelty (3). This situation is unacceptable and identifying abusers is an important role of Law Enforcement. There are many studies linking crimes towards animals to domestic violence, and preventing these situations is part of the goals of modern society (9,11). Animal cruelty is defined as a deliberate action that causes pain and suffering to an animal (9,11). In Brazil, legislation known as the Environmental Crimes Law states that cruelty towards all animal species is criminal in nature (3,7). The area of Legal Veterinary Medicine is growing due to the demand of society in restraining crimes against domestic and wildlife fauna. When wildlife is involved it should be noticed that this is also an environmental crime. According to Interpol, environmental crime is a serious and growing international problem and one which takes many different forms, pushing commercially valuable wildlife species closer to extinction (6). Qualification of Experts, international agencies to perform investigation and science are needed to fight this international network of crimes against the environment.

### Forensic Necropsy

Necropsy is the instrument of forensic pathologists for determining the cause of death. Given its importance, necropsy performance should not be neglected as it is a crucial step in solving a crime scene investigation. A forensic necropsy can take hours of intense work, sample collection and documentation. One first information is pre-necropsy data, and a perinecropsy whenever access to the local of crime scene is possible. Exam of local are crucial to access environmental crimes, where animals may act as sentinels (7). Before conducting the necropsy, information must be gathered about the postmortem interval, body handling, and crime scene. Many of the changes noted at necropsy can only be interpreted correctly at once and correct sample collection is crucial to determine possible causes of death of animals. Postmortem interval can determine significance of lesions and also may mask traces of evidence by running autolysis and external environmental factors. Radiographs of the entire body should be taken before necropsy starts. An instrument of great importance in forensic necropsies is the camera. With the advent of digital cameras, the possibility of instant viewing the object photographed and its low cost made them preferred devices in routine necropsy rooms. But any camera can be used as long as it has high resolution and fidelity in recording images. The camera is going to be used from the beginning to the end of the procedures during the necropsy. So it should be thought as a source of potential proofs in a EWR (9). As a tool it is advised to check if battery is charged and film or memory cards are able to store large number of photographs.

Photographs of the body should be obtained before starting the necropsy. If possible, even photographs at the local where bodies were found should be taken. Multiple photographs should be taken of any lesions, objects close to the body at the crime scene or other abnormalities. Taking a picture of the lesion from a distance, showing the tissues around it, as well as close-up views for smaller lesions, with scales, are very useful to illustrate your descriptions in EWR. Viewing the photographs at a later time can help in demonstrating a line of your findings that will be used to testify the scenario where that death took place. A thorough documentation of the necropsy with pictures is very helpful, a correct interpretation of the lesions, and use of correct terminology is essential to be used in a court. All photographs must include the date, case number, and a scale/ruler. Documentation is crucial to write a EWR or other documents that might be used as legal documents in a process. Compared to traditional postmortems which are usually performed for diagnosis of natural disease, medico-legal postmortem require additional rigorous and detailed documentation to withstand the intense scrutiny of the judicial system (7,9,11). Appropriate terms of forensic traumatology are preferable when trauma and cruelty cases are described. External examination of the body and evaluation of body condition, condition of fur, feather, claws, searching possible ectoparasites, fauna and postmortem alterations should be evaluated. Examining also the color of the mucous membranes and cavities, for signs of emesis and foreign bodies should be performed. In the presence of external injuries, all should be photographed before and after shaving, if shaving is performed (9,11). Examination of the entire body, with an appropriate technique of description of alterations of internal organs that are related to the death of the animal should be described and also fully documented. The injuries must be identified, recorded and described. The collection of samples for additional analysis should be done routinely and methodically, avoiding samples that are lost because either were not collected or were erroneously fixed. In general, it is recommended fixation in 10% buffered formalin for histopathological analysis, and freezing for toxicological analysis. Tissues, essentially fragments, of liver, kidney and stomach contents, and others as needed should be identified and maintained frozen. Forensic necropsy goals blunt force trauma, neglect, wounds and injuries, thermal injuries, firearms injuries, asphyxia and drowning, injuries associated with physical agents, traps and snares, bite injuries, estimation of time since death, sexual abuse of animals and poisoning (11). Also finding non-accidental injury, that can be unnoticed if not accurately observed (3,10,11). Forensic examination and EWR writing should consider general forensic procedures. According to Munro & Munro (11) while describing forensic necropsy it is postulated that procedures should follow a schema considering photography of external surfaces and radiography, necropsy form, receipt, public health factors,

identification of particular species, labels, removal of coverings, body weight and length, opening and collecting samples of internal organs. Descriptions should follow an appropriate terminology suitable to the public that will use it as a proof, or part of a process (9). Comments should recreate the events leading up to death and clearly point the cause of death and possible role of non-accidental or malicious procedures that contributed to or were the cause of death (7). If euthanasia was used to induce death it should be an approved method of humane euthanasia. If the method of euthanasia interferes with future forensic analyses also should be noted. Clearly designate insignificant findings described in the EWR, but of no consequence in the death, if any are noted and collected appropriately to maintain the chain of custody. The role of natural or spontaneous disease in death should be clearly stated and commented as well as documented (4,9,11). The comment section is arguably the most important section in a EWR, as it might contain the possible interpretation of the changes described at necropsy that summarizes all events leading up to and causing death, if it is possible to determine a cause. It is very important that the protection of individuals participating in the procedures be a priority, and for this reason education is essential. In cases involving suspected toxic inhalants, environmental toxic products, zoonosis and wildlife, all protection should be used to avoid accidents.

### **Medico-Legal usage of pathological findings**

Forensic medicine is one branch of medicine using technical and scientific knowledge to clear up facts in the interests of Justice (4,5). Part of the cases can have a medico-legal interest, and for this reason a medical interpretation is needed to solve them. Key fields are litigation, insurance, anesthetic-related death, unlawful killing of animals or regulatory cases that can be submitted to Justice or regulatory professional councils. Different from past decades when animal cruelty legislation was less in evidence, and public prosecutors did not wave enthusiastic in handling cruelty complaints (5), nowadays this is one thriving situation for Law Enforcement and Justice. Increased recognition of forensic medicine and pathology as distinct entities in veterinary medicine is evinced by the number of recent publications on these topics (1,3,7,8) and the formation of an International Veterinary Forensic Science Association (IVFSA). Data from different veterinary diagnostic laboratories indicate that medico-legal pathology cases have increased significantly during the last decade, particularly criminal cases of animal abuse, neglect or illegal killing of companion animals (3,7,8). Pathological findings of necropsies from animals are becoming more frequently used in courts as part of processes involving owners or even veterinarians. Medico-legal interpretation of a necropsy can be fundamental to solve a case. Specific education is needed for future veterinary pathologists to

prepare correctly and report findings in medico-legal cases. When subpoenaed to work in a case as Expert Witness Testimony the veterinarian should have in mind that study, investigation and special care in preparing EWR and legal documents are essential to answer accurately and fulfill the Justice needs. Many factors are involved in this new worldwide professional scenario, like including changes to the Justice system observed in last years, increased media attention, the relationship between animal cruelty and domestic violence (9,11), and increasing professional and public interest (3,8). This is also an outstanding contribution to veterinary pathology education. According to McEwen (8) training in veterinary forensic pathology is contributing to a broad activity that Veterinary Medicine is asked to perform by societal needs. Educating undergraduate veterinary students, veterinary pathologists, and practicing veterinarians in the scientific method as it applies to forensic science is essential to ensure that veterinary forensic science withstands the scientific and legal scrutiny applied to its medical counterpart. EWT provided by veterinarians covers areas of public and environmental health that are part of the concept of 'one world one health'.

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