

## Domestic dogs (*Canis lupus familiaris*) and forensic practice

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The better I get to know men, the more I find myself loving dogs  
Charles de Gaulle (former President of France)

In a previous editorial, injuries and artefacts produced by animal activity were reviewed [1]. The spectrum of findings was discussed ranging from envenomation and anaphylaxis to fatal crush injuries. In this editorial the specific contribution of domestic dogs (*Canis lupus familiaris*) to forensic issues is focused on. Dogs have long been associated with human activities and may be involved with the forensic evaluation of cases at a number of levels affecting death scene examinations, autopsies, and later analyses.

Dogs may, of course, be responsible for deaths if they have attacked individuals. The most vulnerable are the elderly and young children although victims may be of any age, particularly if more than one dog is involved. While at least 25 different breeds of dog were reported in a series of fatalities in the United States, most attacks (60 %) involved pit bull-type dogs, German shepherds, and Rottweilers. Sexually intact, chained, male dogs are the most dangerous [2].

Typically lethal injuries occur around the head and neck region, sometimes with extensive loss of skin and soft tissues. The abdomen and chest may also have been bitten, as may the buttocks and limbs if the victim was brought

down by a dog(s) while trying to escape. The morphology of bite marks is influenced by the shape and nature of the dog's dentition, and the pattern of attack and dental arch shapes tend to be characteristic of a particular breed. Individual lesions consist of puncture wounds and lacerations often with areas of tissue avulsion [3]. This is particularly so if the attacking dog has shaken the victim producing 'hole and tear' injuries [4, 5]. Death is due to exsanguination from tearing of blood vessels, air embolism from damage to neck veins, and/or blunt cranial trauma from crushing of the skull. Carotid artery dissection, asphyxia, or cervical cord injuries may also follow crushing injuries to the neck [6, 7]. At autopsy the possibility of all of these types of injuries should be considered.

Alternatively in individuals who are immunocompromised a seemingly innocuous dog bite may result in death from sepsis in the apparent absence of significant injury. Postmortem blood cultures and microbiological testing may subsequently reveal a pathogen such as *Capnocytophaga canimorsus* that is a commensal in dog mouths [8].

As well as performing an autopsy on the victim, a full necropsy examination should be undertaken on the euthanized dog, ideally with the assistance of a veterinarian. This begins with external photographic documentation and a search for identifying tattoos or microchips. Other features that may assist in identifying a dog, and thus establishing ownership, are collars, tags, scars, and evidence of previous veterinary procedures. This may be important if legal action is being considered [6]. Trace evidence such as blood, clothing fibers, or hair may confirm contact with the victim, and dirt, other dog hair and vegetation may help to identify the dog's previous location. The dog's mouth should be checked for any fragments of clothing, tissue, or blood from the victim [6] and samples of dog hair should be taken. The gastric contents should be examined and

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retained as it may contain victim's remains. Computed tomographic (CT) scanning of the skull and defleshing of the skull and jaws will enable comparison of teeth with bite marks on the victim [9]. Toxicology should be performed on both the victim and the dog; the latter to identify any drugs or stimulants that may have been given to a fighting dog to exacerbate aggressive behavior [10].

While trained dogs may be useful in detecting and identifying human remains a more common forensic scenario involves disruption of scenes and postmortem mutilation of bodies when a captive dog has been left with a body. A dog may track putrefactive fluids or blood throughout a house thus complicating forensic assessment by raising the possibility of inflicted injury. The typical scenario involves a socially-isolated individual who has been dead within a house for some time [11, 12]. Dogs left in a house without food will eventually feed on the remains of their owners [13]. This activity may result in significant problems at the time of autopsy as large wounds may suggest inflicted injuries to investigating police officers, and in the case of genuine homicides the morphology of inflicted injuries may be considerably altered by animal feeding. This is particularly so as dogs, like many other animals and insects, are drawn to moist areas such as stab and bullet wounds. Licking and ingestion of tissues may considerably modify the dimensions of wounds and in some cases projectiles within tissues may be eaten [1]. If the death of the owner was due to a natural disease the autopsy proof of this may not be possible if the organ of concern, for example the heart, has been consumed.

Finally, trace evidence from dogs may be useful in cases where the location of a victim over time is either unknown or in dispute. With Locard's principle the finding of dog hairs may be all that is necessary to demonstrate that contact has occurred between the decedent and dog at a particular location prior to, or after, death.

It is clear that domestic dog activity may be encountered in a variety of forms in forensic practice. Dogs may be responsible for significant ante-mortem and postmortem injuries, both of which need careful evaluation and differentiation. Mistaking paired dog bite marks for inflicted stab wounds has occurred with disastrous consequences [14], and confusing postmortem predation with ante-mortem injury may initiate unnecessary police investigations. While dogs may certainly be forensic pathologists' or

police officers' best friends in some situations, in others they may create considerable problems complicating the evaluation of cases. An understanding of the manifestations and potential effects of canine activity should assist in clarifying issues in cases where dogs are involved.

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