

**CASE REPORT****ODONTOLOGY**

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## An Unusual Case of Predation: Dog Pack or Cougar Attack?\*

**ABSTRACT:** Injuries produced by animals are capable of leaving severe patterns and in some cases may result in the death of the attacked individual. Law enforcement authorities may come to erroneous conclusions about the source of the bites based on their awareness of animals present and similarities of the injuries to the untrained eye, with dreadful consequences. Expertise of a carnivore biologist and an odontologist that identifies the particularities of bite marks may be useful for identifying the attacking species. We present the investigation of a fatal dog pack attack involving a 43-year-old man in Bell Ville (Argentina) where the evidence provided by a forensic dentist and a biologist was categorical for establishing the animal species involved. Because of the unusual characteristics of the wounds and the initial hypothesis made by local authorities of a cougar attack, habits and specific patterns of both dog pack and cougar predation on humans are discussed.

**KEYWORDS:** forensic science, forensic dentistry, forensic biology, bite marks, injuries, Argentina

Injuries and bite marks produced by animals are capable of leaving severe patterned injuries and in some cases may result in the death of the attacked individual. In these cases, the investigator must be able to differentiate animal bites from other possible causes and to identify the animal perpetrator (1). Wild animals are rarely the cause of death in urban areas, but when fatal attacks do occur, they generate enormous publicity and fear. By contrast, dog bites are common and may result in serious injury and consequent litigation (2,3).

Although the knowledge of local fauna may be useful to determine the origin of bites (4), the reported presence of different animal species in the area and their "similar" patterns of injuries (to the untrained eye) can originate mistakes and misinterpretations (1). In these cases, knowing the predatory behaviors of different species may be useful for identifying the source of bite marks (4,5).

Multidisciplinary investigation, including a detailed assessment of the scene, the victim, and the animals suspected as perpetrators of the attack, is recommended (6,7). The forensic pathologist plays the major role in the identification of cause of death (8). When bite marks are found, expertise of a forensic odontologist is advised (1,9). Also forensic biologists can provide additional information on sources of maulings or evidence of scavenging

that can be used to solve crimes when police forces deal with such incidents (2).

This article presents a fatal attack on a 43-year-old man by a dog pack. Because of the unusual characteristics of the wounds and the initial hypothesis of a cougar attack, habits and specific patterns of both dog pack and cougar predation on humans are discussed.

### Case Report

In April 2011, in Bell Ville (Cordoba, Argentina), a 43-year-old man was found dead almost 24 h after being seen for the last time at the Regional Local Hospital. The man, a patient of the mental health area, was found at 9 AM on an abandoned sector of the Hospital's grounds. His body was in a supine position, and he was naked except for one shoe on the left foot. Clothing was found shredded and scattered in the surroundings, suggesting that he had been pulled to the ground in several places during the event. The initial external examination revealed an extensive wound in the left superior thorax, with bone fractures, loss of multiple chest structures, including ribs, sternum, heart, aorta and left lung, and numerous contusions, abrasions, lacerations, and puncture wounds all over the body (Fig. 1). Severe deep lacerations on both shoulders were observed, and a considerable amount of skin, subcutaneous fatty tissue, and muscle were missing in both arms in almost circular wounds, suggesting damage from an animal attack (Fig. 2). The wounds' edges revealed many small, parallel, partially curved notch marks suggestive of bite marks, and the hemorrhagic reactions present in the tissues showed the vitality of the injuries. There were multiple lacerations and puncture marks on the thighs, over the inferior torso, and on both wrists and forearms, consistent with defensive injuries. No cervical vertebral fractures or scalp puncture wounds perforating the skull were found. The cause of death was attributed to exsanguination originating from the

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FIG. 1—Detail of the extensive wound on the left superior thorax, with bone fractures and loss of ribs, sternum, heart, aorta and left lung. See the small, parallel and partially curved notch marks suggestive of bite marks on the wound's edges.



FIG. 2—Detail of puncture marks and deep lacerations on the left shoulder and arm with loss of skin, subcutaneous fatty tissue and muscle. The puncture marks and lineal lacerations present on legs, wrists, and forearms and over the inferior torso were consistent with defensive injuries.

extensive injuries, and the lack of puddles of blood at the scene suggested that it had been licked up by the predator.

At the scene, there was a pack of mixed-breed dogs of various sizes. These animals were reported to attack two other patients on previous days, both of whom survived with only superficial lacerations and marks, although one reported he was “saved” by the hospital cook who chased the dogs away. The dogs did not display any aggressive behavior to the police officers who arrived at the scene, but they were elusive and disappeared into the nearby woods. After the corpse was found, 12 dogs of different sizes were trapped inside the hospital grounds, but these animals were not available for bite mark comparison.

Once the body was taken to the local morgue and autopsied, the massive bleeding was confirmed as the cause of death. Despite the large number of dogs found at the scene, investigators proposed the initial hypotheses of predation either by very large dogs (dogo argentino, mastiff, etc.) or a cougar (unusual but possible habitant of the area) because of the size and character of the wounds. The local authorities called a forensic dentist (GMF) and a carnivore biologist (RP) to assess these hypotheses and to determine the species that produced the injuries. Neither expert had access to the crime scene and worked only from photographs and the autopsy report. The toxicology report was not

available, but it was known that the victim took several psychotropic medicines, as part of his regular treatment.

The report of both experts revealed that the injuries were consistent with attack by a dog pack: the victim was forcibly knocked down, and the extensive injuries were the cause of loss of blood. The extensive wound in the thorax appeared to have been inflicted postmortem. Lacerations in both arms were interpreted as defensive injuries. Both experts clarified that, although the evidence in this particular case was sufficiently categorical to establish the animal species that produced the fatal attack, the poorly processed scene and the lack of complete information of the autopsy were completely irregular and could lead to wrong conclusions.

## Discussion

Some families of the order *Carnivora* include species that are capable of attacking or killing a human being (2). Felids (*Felidae*) and canids (*Canidae*) are the most widely distributed large carnivores on the planet, and they are well equipped to prey with powerful jaws, claws, and shearing teeth (4). The way in which an animal attacks its prey depends on the species and its hunting behavior (5,10,11).

The cougar (*Puma concolor*) is the most widely distributed large mammal in the Americas (12,13). Cougars are elusive and secretive, usually avoiding open spaces that lack sufficient cover. They are solitary hunters, stalking their prey and killing with a bite on the neck or muzzle before feeding (10,13–15). In the few reported cases of human victims, the victims did not see the cougar before being clawed or bitten (16). Cougar bites and lacerations on human skin are often described as sharp and clean, with the neck the primary site of attack. The damage produced at the neck is either a forcible hyperextension causing cervical vertebra fracture or a sharp transection of anterior neck structures while bringing down the prey (10,13,17). The cougar may shake the captured individual and may also use its claws (10,17). A common behavior is dragging the captured individual from the initial kill site to a more covered area for feeding. Cougars are territorial, and they usually hunt within their own territory (18,19). Cougars usually avoid areas used by humans (18–20), but it has been suggested that with regular proximity, they may identify humans as possible prey (13,17); this will be evident from an increased number of cougar sightings (17). Carnevali (14) indicates that over 63% of cougar attacks on humans are on children. Attacks on grown adults are less common, but Conrad refers to the case of an 18-year-old boy killed by a cougar in Colorado (U.S.A.) (17). The victim was suddenly attacked, the animal bit his neck, and claw marks were found on the left posterior and superior thorax (back), with scarce defensive injuries on the left upper arm. In Argentina, cougar attacks are far less common than in other countries, but in 1997, a cougar killed a child at Iguazu National Park (21).

Postmortem damage produced by cougars for feeding could be similar to that produced in this case, including the evisceration of the carcass to feed on the liver, lungs, and heart (10,13,17), but there were several relevant differences. There was no evidence of the *killing bite* (10,21–23) or signs of covering the remains (10). The presence of defensive injuries and the lack of reports of recent cougar sightings made the experts reject the hypothesis of a cougar attack.

Dog pack attacks are a problem of increasing concern worldwide. Dogs are social animals and possess an inherent pack instinct. Although individually benign, dogs that are part of a

group can become aggressive, and attacks may occur. They can become excited and brought to a state of frenzy by the smell and taste of blood. Therefore, dogs acting as a group are far more dangerous than individuals (5). Usually, packs are composed of dogs from urban areas that attack livestock, provoking severe damage to animals (22,24). Dog pack attacks on humans are unusual, but if they occur, they may result in fatal injuries (25,26). Several reported cases of severe injuries are associated with large dogs, but any type of dog can become aggressive, and the relevance of the damage is usually related to the vulnerability of the victim (25,27–30). Kills made by domestic dogs usually display the evidence of much chewing and harassment prior to killing (31). An attacking canid will immobilize its prey by striking at the limbs. Once the prey has been brought down, dogs will attack any body part until it stops moving (5,26). Dogs produce considerable mutilation of the body; lesions usually involve a combination of biting, clawing, and crushing forces resulting in wounds with a characteristic pattern of punctures, lacerations, and avulsions of the skin (4,5), also with marginal abrasion, hemorrhage, and deep tissue bridging (17). Dogs will eat before the victim is dead (5). In humans, the most frequent sites of injury are on the head, face, and neck, although in several cases wounds and defensive marks can be seen on the upper and lower extremities (5,7,30). Extensive injuries can be observed in other sectors of the body, like the thorax, buttocks, thighs, and arms (6,26,32).

While the cause of death may be readily apparent in cases of fatal dog attack, an understanding of how and why the attack occurred requires a complete investigation (29) and postmortem scavenging should be excluded. Postmortem injuries have an absence of hemorrhages in the tissue adjacent to the wound margins (33); there is a predilection for exposed parts of the body, and no self-defense injuries are evident. None of these indicators were present in this case, but several others were (i) a pack attack inflicts severe injury; (ii) dogs first bite the victim's hind-quarters and then the superior portion of the body when the victim falls; (iii) there can be extensive soft tissue loss; and (iv) clothing can be shredded (25,26).

In this case, the presence of defensive injuries, the vulnerability of the victim, and the previously reported aggressive behavior of the dogs supported the hypothesis of a dog pack as the source of the attack (29). We concur that the threat associated with canid attack is proportional to the sizes and number of dogs, but highlight the relevance of the victim's vulnerability. Victims are vulnerable because of their size (6,7,29), physical condition (26), or mental disabilities (34). In the present case, the mental disability of the victim combined with the effect of strong sedative medicines could have increased his vulnerability. This refutes the initial hypothesis considered by local authorities regarding the size of the attacking dogs.

### Conclusions and Recommendations

People that live in close proximity to native predators generally consider them dangerous, even when no incidents have been reported. Additionally, they fail to identify dogs as a possible threat to humans or livestock (10,22,35). When dog pack attacks exist near urban areas, those animals are usually domestic, and their attacking behavior is related to pack instinct. When they attack livestock, they kill or wound several animals that make the livestock breeder eliminate the dogs, generating a social problem (1,10). In the case of an attack, witness testimony should be evaluated in conjunction with

physical evidence and the circumstances of the event. Expert testimony is crucial in determining the origin of certain injuries, particularly when an animal attack is suspected. Animal predation may present bizarre characteristics that may be misinterpreted by law enforcement authorities. As an example, injuries caused by canine teeth could seem to be because of sharp instruments (1). In animal attacks, knowledge of ecological and environmental characteristics surrounding a crime scene may assist in its interpretation (4).

Odontologists and biologists are not experts in determining cause of death, which is the role of the forensic pathologist, but they can be very helpful in assessing additional facts (36). Normally, the complementary analyses they provide are separated from the medico-legal autopsy or the recovery of human remains (8,9). In cases where there are no proper protocols, as in the one reported here, those professionals may not even have access to the crime scene, making it more challenging to properly identify evidence. As suggested by Dorion (37), we consider that the participation of experts in all the stages of the procedure could maximize the evidence recovery rates avoiding erroneous and "potentially catastrophic" opinions.

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