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Decapitation and Exsanguination in a Domestic Cat (Felis catus): A Forensic Case Report

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Case Report

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Abstract

This report describes the post-mortem investigation of a feline presenting signs of decapitation and exsanguination. Radiography and necropsy enabled lesion identification and evidence documentation, supporting the preparation of a technical opinion for judicial purposes.

Introduction

Forensic Veterinary Medicine is a rapidly expanding field within veterinary sciences that applies forensic science principles and methods to investigate cases involving animals. This discipline plays a fundamental role in the justice system by providing material evidence to elucidate incidents of abuse, cruelty, trafficking, neglect, environmental crimes, and other offenses against animal integrity and welfare. Moreover, it is essential for producing forensic evidence that supports legal accountability and strengthens animal protection policies (1).

Animal abuse can be subclassified into two main categories: direct and indirect actions. Direct actions cause unnecessary pain, physical suffering, or emotional distress and are characterized as acts of cruelty. Conversely, indirect actions involve the omission of essential care related to animal health, welfare, and safety, and are classified as neglect (2).

Animal abandonment is classified as a crime of abuse under Article 32 of Law No. 9,605/1998, and the person responsible for the omission must compensate for damages caused. However, since criminal intent is often difficult to establish in these cases, penalties are frequently mild (3).

With advances in case law related to animal protection, the enactment of Law No. 14,064/2020, known as the Sansão Law, represented a significant milestone in strengthening penalties for crimes of abuse against dogs and cats. This legal provision amended Article 32 of Law No. 9,605/1998, increasing the penalty from detention of three months to one year to imprisonment of two to five years, in addition to a fine and prohibition of animal custody. Furthermore, in cases where abuse results in the animal's death, the penalty must be increased by one-sixth to one-third, as provided in paragraph 2 of the same article (4).

An association has been reported between crimes involving animal abuse and antisocial behavior in adults. Link Theory describes the relationship between domestic/family violence and animal abuse, indicating that in violent environments, all members, whether human or non-human, are exposed to such aggression (5).

Given this complexity, forensic investigations of animal abuse and suspicious animal deaths require precise methods to elucidate their causes. Conventional necropsy remains the gold standard for determining the cause of death in forensic investigations. However, complementary examinations, such as histopathological, toxicological, and imaging analyses, have proven essential for increasing diagnostic accuracy in both natural deaths and suspicious or criminal cases (6).

In this context, virtual necropsy (virtopsy), performed through diagnostic imaging techniques such as computed tomography (CT) and magnetic resonance imaging (MRI), emerges as a tool of significant investigative value. Unlike traditional necropsy, virtopsy does not require opening the cadaver, thereby preserving anatomical integrity and allowing permanent conservation of records for documentation and judicial evidence purposes (7).

In cases of sudden or traumatic death in forensic contexts, traditional necropsy alone may not provide sufficient information to elucidate the trauma mechanism, the exact location of lesions, and the cause of death within the broader context of the entire process.

In such cases, the initial use of radiographs for anatomical reconstruction represented an important advance. Subsequently, with technological development, more sophisticated diagnostic imaging techniques, such as computed tomography (CT) and magnetic resonance imaging (MRI), began to be employed, enabling precise determination of lesion location and extent (8).

Radiography is particularly valuable in forensic veterinary investigations for detecting alterations that may not be easily identified during conventional necropsy. Among these findings, fractures in small bone structures and the presence of foreign bodies are particularly noteworthy, as their exact location can be accurately determined using this technique (8).

In addition to its diagnostic value, radiography plays a strategic role in reconstructing trauma dynamics, allowing the trajectory and impact of forces involved to be understood. This capability is particularly relevant in forensic contexts, where detailed reconstruction of the circumstances surrounding an event is essential for formulating forensic hypotheses and conclusions. Moreover, radiographic images constitute permanent records that can be stored and re-evaluated throughout the investigative and judicial process, ensuring information traceability and enabling review by different experts, thereby strengthening the robustness of the evidence presented (8).

Specific radiographic patterns may indicate injuries resulting from violence and assist in case investigations. These features are more frequently observed in non-accidental injuries, such as fractures at different stages of healing, indicating repeated trauma episodes; bone callus presence and injury distribution in specific body regions; contusion injuries and disseminated hematomas; wounds and lacerations from physical aggression and injuries caused by burns or other types of intentional trauma. The most commonly affected areas include the head, ribs (with bilateral and multiple lesions), teeth, and the forelimbs and hindlimbs, which often present transverse fracture patterns (9, 10)

Materials and Methods

The procedures described in this report complied with institutional guidelines and informed consent was obtained from the animal owner for the use of clinical and forensic data. The animal was submitted for forensic examination as part of a judicial investigation.

The case involved a 3-year-old spayed female mixed-breed cat. According to the clinical history provided by the owner, although the animal was housed indoors, it was accustomed to roaming the neighborhood and had disappeared on the date the cadaver was found.

The cadaver was found headless, with no visible bloodstains at the scene. This suggests that the animal was removed from the yard, killed elsewhere, and subsequently returned.

The cadaver was frozen and, after 12 days, was referred to the School of Veterinary Medicine and Animal Science (FMVZ), São Paulo State University (UNESP), Botucatu. To facilitate the examinations, the cadaver was thawed for approximately 24 hours.

Radiographic examination in lateral and ventrodorsal projections revealed a complete fracture between the skull and cervical spine (C1–C2), characterizing decapitation, with absence of osseous continuity between the cervical spine and skull. The left thoracic limb could not be located; only remnants of the humerus were observed. The humerus was fractured obliquely and positioned inversely to its normal anatomical arrangement (Fig. 1).

Gross necropsy findings revealed complete decapitation, with the section plane located cranial to the thoracic vertebrae. A transverse incision involving the trachea and adjacent muscles was observed, with linear cut margins characterizing the causative instrument as a sharp-force tool with active energy application and no features suggestive of predation. In the left thoracic region, exposure of intercostal musculature with a blackened appearance was observed, but without evidence of hemorrhage. The viscera were preserved.

Histological analysis revealed the absence of intravascular erythrocytes in skeletal muscle (Fig. 2), kidneys, and liver. As a comparative control, the same procedure was performed using frozen bovine muscles from an animal that had undergone exsanguination during slaughter. The alterations observed in both examinations were similar, supporting the hypothesis that decapitation occurred after exsanguination.

Discussion

The investigation of suspicious animal deaths requires evidence regarding the materiality of the events. To achieve this, a multidisciplinary approach involving diagnostic techniques can significantly contribute to case elucidation, and the combined use of imaging examinations and necropsy assists in reconstructing event dynamics and determining the cause of death (6). In the present case report, the integration of these tools enabled characterization of complete feline decapitation, providing important evidence for forensic interpretation.

Radiological findings were crucial for objective documentation of lesions, demonstrating complete separation of anatomical segments between the skull and cervical spine, as well as the presence of

displaced bone fragments. Additionally, post-mortem radiography allowed preservation of the visual record, which was subsequently used for forensic analysis (9).

During necropsy, radiographic findings correlated with evidence of tissue disconnection involving the trachea and adjacent cervical muscles. This lesion was compatible with sharp-force instrument action, as the margins were linear and regular, indicating human intervention (11).

Among the post-mortem findings in this cadaver, no evidence of hemorrhage was identified in the areas of tissue sectioning, an important feature of ante-mortem injuries (11).

Therefore, the gross and microscopic findings suggest that decapitation occurred after death or after substantial loss of circulating blood volume. In this regard, the absence of intravascular erythrocytes in skeletal muscle tissue during histopathological examination supported this hypothesis (12).

From a medico-legal perspective, this case demonstrates the relevance of integrating diagnostic methods for investigating and documenting evidence related to crimes involving animals. This approach provides a technical framework for clarifying both the mechanism of trauma production and the cause of death, essential elements for supporting judicial proceedings.

Conclusion

This case report describes complete decapitation in a domestic feline, with the cause of death determined through the integration of post-mortem radiographic examination and necropsy. The findings identified lesions compatible with a sharp-force instrument, with no evidence of predation or necrophagy, strongly suggesting human intervention.

The absence of hemorrhage in tissues during histopathological examination was a significant finding supporting the hypothesis that trauma occurred after death or after exsanguination. Thus, the integration of diagnostic methods proved essential for elucidating both the mechanism of injury and the cause of death.

Declarations

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Author Contributions

L.F.P.A. participated in data analysis and manuscript writing. N.S.R. supervised pathological analyses. A.R.D.P.M. and V.M.V.M. contributed to manuscript review and scientific supervision.

Conflict of Interest

The authors declare no conflict of interest.

Ethical Declaration

Ethical approval was not required because this study reports findings from a deceased animal examined for forensic purposes.

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Figures



Figure 1

Post-mortem radiographic image of a domestic cat (*Felis catus*) obtained in lateral projection. Complete separation between the skull and the cervical vertebral column is observed, with disruption of the atlantoaxial region (C1–C2), consistent with traumatic decapitation.

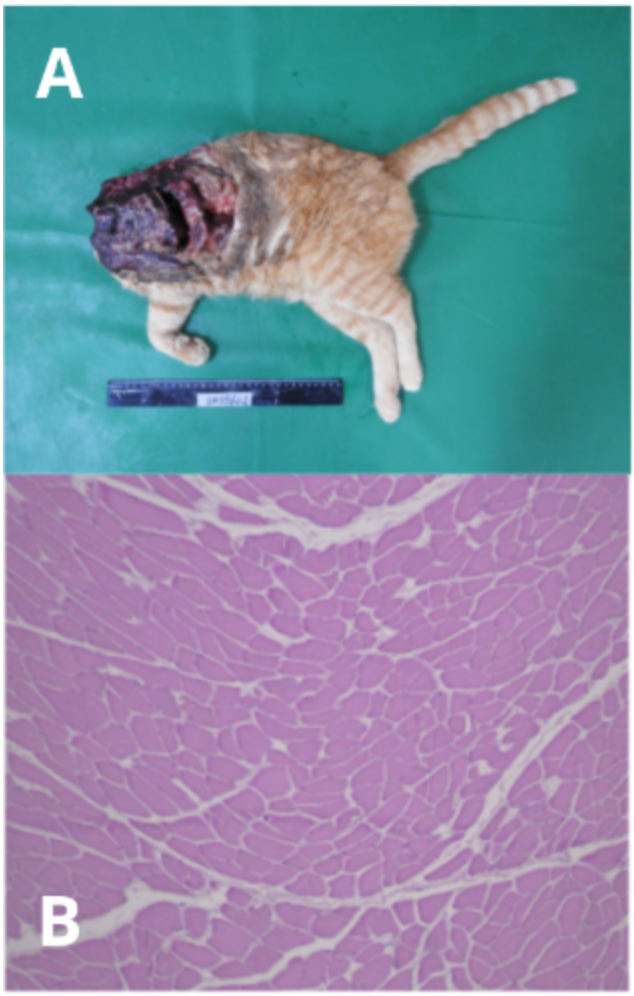


Figure 2

Forensic findings in a domestic cat (*Felis catus*). **(A)** Gross necropsy image demonstrating complete separation of the head from the cervical region, with disruption of soft tissues and anatomical structures cranial to the atlantoaxial junction. **(B)** Histopathological section of skeletal muscle (H&E stain) showing increased interstitial spacing, edema, and loss of normal fiber organization, consistent with post-mortem degenerative changes. The marked reduction in intravascular erythrocytes supports the hypothesis of severe exsanguination prior to decapitation.