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PLASTIC SEAL IN OVARIOHISTERECTOMY: NECROSCOPIC FINDING AND ETHICAL-LEGAL CONSIDERATIONS

Lacre plástico em ovariohisterectomia: achado necroscópico e considerações ético-legais

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Abstract

Ovariohysterectomy is an effective way to mitigate population growth, anthropozoonotic diseases and determined neoplasms and systemic infirmities. For that, a variety of surgical methods are used in this procedure, such as the usage of plastic seal, specially applied in castration campaigns. In this context, a commented version of Federal Council of Veterinary Medicine Resolution No. 1,596/2024 establishes that the use of adapted materials or equipment in such procedures is prohibited, exemplifying this with the use of plastic seals. The present case reports a necroscopic finding associated with the use of a plastic seal during an ovariohysterectomy procedure, making it possible to conclude that the use of such material is detrimental to animal health and welfare. Furthermore, veterinarians who use this type of object may be subject to administrative sanctions, based on both the Code of Ethics and the Consumer Protection Code, as well as civil liability under the Code of Civil Procedure.

Keywords: Castration; forensic veterinary medicine; necropsy.

Resumo

A ovariohisterectomia (OH) é uma maneira eficaz de mitigar o crescimento populacional, as doenças antropozoonóticas e determinadas enfermidades neoplásicas e sistêmicas. Para isso, variados são os métodos cirúrgicos empregados no procedimento, como é o caso do lacre plástico de

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náilon, principalmente utilizado em campanhas de castração. Nesse contexto, a versão comentada da Resolução CFMV nº 1.596/202 determina que não deve haver a adaptação de materiais nestes procedimentos, exemplificando o uso de lacre plástico. O presente trabalho aborda um achado necroscópico de utilização de lacre plástico de náilon em cirurgia de OH em que foi possível concluir que o emprego do lacre plástico de náilon é prejudicial à saúde e bem-estar dos animais. Ademais, o médico-veterinário que faz uso deste objeto está sujeito a processos administrativos, pelo descumprimento do Código de Ética Profissional e do Código de Defesa do Consumidor, além de cíveis, pelo Código de Processo Civil.

Palavras-chave: Castração; medicina veterinária forense; necropsia.

Introduction

Animal castration is an established practice historically employed to facilitate reproductive and behavioral management of herds. Its benefits, however, extend beyond these aspects, as sterilization techniques are also used for the prevention and treatment of certain neoplasms and diseases of the reproductive tract, as well as for stabilizing specific systemic conditions (Romagnoli *et al*., 2024).

In females, castration may be performed using ovariohysterectomy (OH) or ovariectomy, with ligatures made from absorbable or non-absorbable synthetic materials (Romagnoli *et al*., 2024). Among these, the use of nylon plastic cable ties has been described in the literature (Barros; Sanches; Pachaly, 2010; Camacho *et al*., 2025; Costa Neto *et al*., 2009; Dionizio; Bonfada; Schaffer, 2014; Reis, 2024; Lima *et al*.; 2010; Lustosa; Medeiros, 2014; Macedo *et al*., 2012; Magalhães; Lot, 2016; Rabelo *et al*., 2008; Romagnoli *et al*., 2024; Trajano *et al*., 2017).

Plastic cable ties, or nylon zip ties, are originally intended for electro-hydraulic purposes, specifically for securing wires and cables. However, their empirical use has been reported in surgical procedures due to desirable characteristics, particularly in large-scale sterilization campaigns and spay–neuter programs (Barros; Sanches; Pachaly, 2010; Costa Neto *et al*., 2009; Lima *et al*., 2010; Lustosa; Medeiros, 2014; Macedo *et al*., 2012). Despite this, studies have demonstrated the risks and complications associated with the use of this material in OH procedures in female dogs (Camacho *et al*., 2025; Dionizio; Bonfada; Schaffer, 2014; Reis, 2024; Macedo *et al*., 2012; Magalhães; Lot, 2016; Rabelo *et al*., 2008; Romagnoli *et al*., 2024; Trajano *et al*., 2017).

Furthermore, the annotated version of Resolution No. 1,596/2024, issued by the Federal Council of Veterinary Medicine (CFMV), states in Article 4, item XVI, that materials used in veterinary establishments must be applied strictly for their intended purposes, prohibiting adaptations that may compromise animal health and welfare, as is the case with nylon plastic cable ties.

This study aims to report a case of necropsy findings involving the use of nylon plastic cable ties in an OH procedure, with a focus on the ethical and legal implications.

Case Description

An 11-year-old spayed female Shih Tzu, weighing 5.4 kg, was admitted to the FMU Veterinary Hospital. The primary complaint included foul oral and cutaneous odor, ocular and nasal discharge, and progressive growth of a mass in the maxillary region.

On physical examination, alopecic areas were observed on both flanks. Oral examination revealed a mass in the right maxillary region involving almost the entire hard palate, as illustrated in Figure 1.

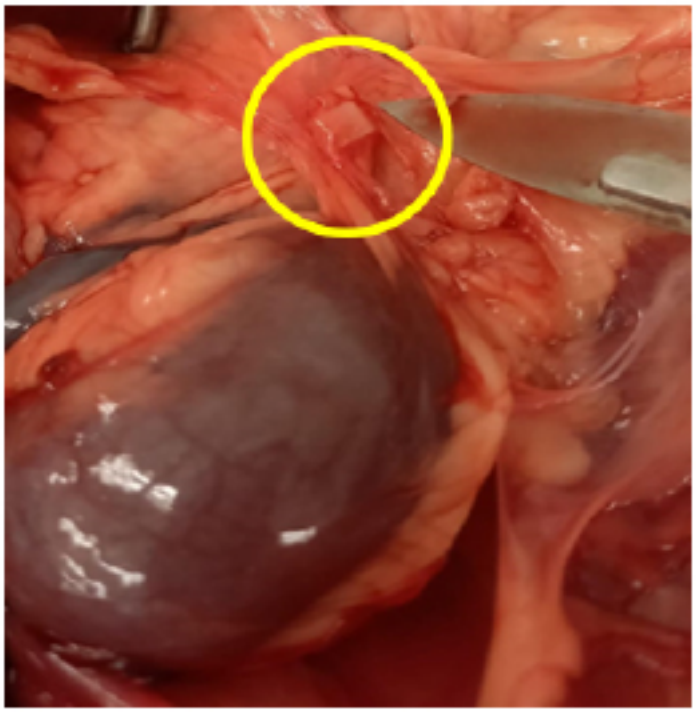
Figure 1 – Mass in the maxillary region involving the hard palate

T Source: Sousa (2024).

Cytopathological examination of the oral lesion was consistent with melanoma. Thoracic radiography revealed multiple circular areas, measuring approximately 0.44 mm, located in the lungs. Given the worsening clinical condition and poor prognosis, euthanasia was elected.

A necropsy was subsequently performed. Upon opening the abdominal cavity, three foreign bodies were identified, partially surrounded by granulomatous tissue. Two were located in the mediocaudal region relative to the kidney and near the ureters, as shown in Figure 2, and one was located in the region of the ovarian pedicle.

Figure 2 – Nylon plastic cable tie (yellow circle) in the mediocaudal region relative to the kidney



T Source: Sousa (2024).

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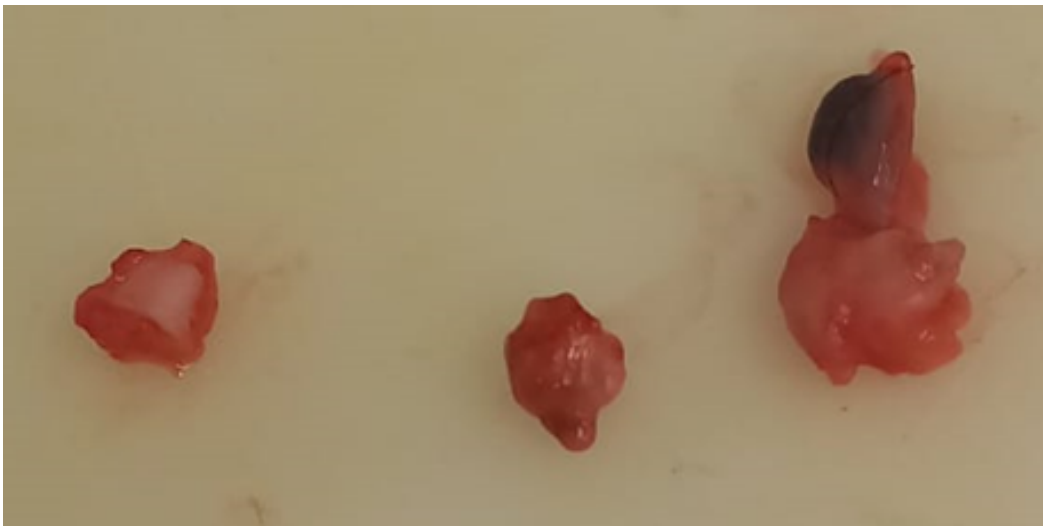
When isolated, these objects were identified, as shown in Figure 3, as nylon plastic cable ties, commonly referred to as ''zip ties.''

Figure 3 – Isolated nylon plastic cable ties



T Source: Sousa (2024).

Discussion

Since 2001, the municipality of São Paulo has recognized, through the Permanent Program for the Reproductive Control of Dogs and Cats (Municipal Law No. 13,131/2001), that sterilization campaigns represent an effective strategy to mitigate population growth and animal abandonment, as well as to curb the increase in anthropozoonotic diseases transmitted by these species. In 2024, the Federal Council of Veterinary Medicine (CFMV) established regulatory guidelines (Resolution No. 1,596) outlining the basic rules for the implementation of such programs. Therefore, there is clear institutional recognition of the importance of sterilization of small companion animals for both animal and public health.

Castration techniques in females vary, with ovariohysterectomy (OH) being the most commonly performed, characterized by the surgical removal of the ovaries and uterine body. In general, suture materials used in surgical procedures must be selected based on criteria such as high tensile strength, fine and uniform caliber, high flexibility, minimal tissue reaction, cost-effectiveness, hypoallergenic properties, ease of sterilization, and the absence of carcinogenic, toxic, or corrosive effects, as well as not promoting bacterial growth. For such procedures, the use of absorbable monofilament sutures is recommended due to their lower inflammatory potential and reduced bacterial adherence (Atallah *et al*., 2013; Figueiredo; Garcia; Ferreira, 2021; Fossum, 2014; Lustosa; Medeiros, 2014; Magalhães; Lot, 2016; Romagnoli *et al*., 2024). Despite these recommendations, the use of plastic cable ties (nylon zip ties) in these surgeries remains common.

Nylon cable ties are designed to fasten and organize wires and cables in electronic devices, possessing properties that allow them to withstand high temperatures (up to 260 °C) and strong tensile forces (Barros; Sanches; Pachaly, 2010; Macedo *et al*., 2012). Despite their original purpose, these devices have been adopted in veterinary surgical procedures for both large and small animals for several reasons, including reduced operative time and material use during surgery, as hemostatic forceps and the time required for conventional suture knotting can be minimized; effective hemostasis; ease of application; flexibility; low cost; and simple sterilization (Barros; Sanches; Pachaly, 2010; Costa

Neto *et al*., 2009; Reis, 2024; Lima *et al*., 2010; Magalhães; Lot, 2016; Rabelo *et al*., 2008). These characteristics are particularly attractive in large-scale sterilization campaigns, which aim to operate on the greatest possible number of animals in the shortest time and at the lowest cost, often to ensure the feasibility of such initiatives (Atallah *et al*., 2013; Barros; Sanches; Pachaly, 2010; Costa Neto *et al*., 2009; Lima *et al*., 2010; Lustosa; Medeiros, 2014; Reis, 2024).

Despite these advantages, the use of this material in surgical procedures is contraindicated due to its association with several complications, including granuloma formation and intra-abdominal adhesions; abscesses; ulcerations and fistula formation; urinary incontinence; hydronephrosis; as well as the risk of internal hemorrhage resulting from failure of manual closure or displacement of the nylon cable tie; tenesmus and constipation when abscesses lead to extraluminal intestinal obstruction; anorexia; among others (Camacho *et al*., 2025; Dionizio; Bonfada; Schaffer, 2014; Reis, 2024; Macedo *et al*., 2012; Magalhães; Lot, 2016; Rabelo *et al*., 2008; Romagnoli *et al*., 2024; Trajano *et al*., 2017).

In the present case, one of the main complaints reported by the owner concerned the animal's skin condition. The owner stated that fistulas on both flanks had affected the dog for years, which is consistent with the literature indicating that complications arising from the use of plastic cable ties in OH procedures typically occur months to years after surgery, making causal association more difficult. Therefore, this should also be considered as a differential diagnosis in such cases (Atallah *et al*., 2013; Camacho *et al*., 2025; Figueiredo; Garcia; Ferreira, 2021; Macedo *et al*., 2012; Magalhães; Lot, 2016; Reis, 2024). In this report, visualization of the plastic cable ties through complementary imaging examinations was not possible, as also described by Atallah *et al*. (2013) and Reis (2024), and their identification was therefore made as a necropsy finding.

During necropsy, upon opening the abdominal cavity, three foreign bodies surrounded by granulomatous tissue were identified in anatomical locations typically associated with ligatures performed during OH. When the granulomatous capsule was incised, nylon cable ties were visualized, confirming that they were embedded within the tissue, as previously described in the literature: Atallah *et al*. (2013), Camacho *et al*. (2025), Reis (2024), Figueiredo, Garcia and Ferreira (2021), Macedo *et al*. (2012), Magalhães and Lot (2016) and Rabelo *et al*. (2008).

Furthermore, studies supporting the use of nylon cable ties in surgical procedures (Lima *et al*., 2010; Rabelo *et al*., 2008) reported postoperative follow-up over a limited period of 60 to 90 days. Current evidence indicates that the most significant complications may take months to years to manifest; therefore, longer follow-up periods are required (Atallah *et al*., 2013; Camacho *et al*., 2025; Figueiredo; Garcia; Ferreira, 2021; Macedo *et al*., 2012; Magalhães; Lot, 2016; Reis, 2024).

Despite these considerations, nylon cable ties continue to be widely used in spay–neuter campaigns for dogs and cats, even though CFMV Resolution No. 1,596/2024 establishes, in Article 4, that the technical veterinarian is responsible for ensuring: XIII—the quality and safety of procedures at all stages; and XVI—that materials and equipment are used exclusively for their intended purposes, explicitly citing plastic cable ties in the annotated version. In the present case report, the animal's owner stated that the female dog had been spayed during a sterilization campaign.

Moreover, in the most recent consensus on the topic, the World Small Animal Veterinary Association states that the use of nylon plastic cable ties in small animal sterilization procedures is not recommended due to the high risk of infection and fistula formation (Romagnoli *et al*., 2024).

Furthermore, the Code of Ethics for Veterinary Professionals (CFMV, 2016) clearly states in Article 3 that it is the professional's responsibility to strive to improve standards of animal welfare, animal, human, and environmental health, as well as the quality of veterinary medical services. In addition, Article 6 establishes that veterinarians must: I – continuously update their knowledge and apply the best available scientific advancements for the benefit of animals, humans, and the environment; and VIII – report research, testing, teaching practices, or any other activities involving animals that fail to comply with ethical principles and appropriate procedures. This stands in contrast to the scenario

observed in some sterilization campaigns and settings where non-surgical objects are used instead of appropriate surgical materials for the sterilization of dogs and cats.

In this context, veterinarians who use nylon plastic cable ties in surgical procedures, considering the provisions established in Resolutions No. 1,138/2016 and No. 1,596/2024, as well as the current literature demonstrating the risks and undesirable long-term outcomes associated with their use, in addition to the availability of highly advanced and safe suture materials currently on the market, may be subject to administrative proceedings for noncompliance with the Code of Professional Ethics and the Consumer Protection Code (Law No. 8,078/1990), as well as civil liability proceedings under the Code of Civil Procedure (Law No. 13,105/2015).

In the present case, it is understood that, due to non-compliance with the aforementioned resolutions, administrative proceedings initiated by the relevant Regional Council would be warranted to assess the ethical violations committed by the professional, with penalties varying accordingly (CFMV, 2016). With regard to proceedings under the Consumer Protection Code, pursuant to Article 14, once professional fault is established in court through expert veterinary testimony, compensation for damages must be provided upon demonstration of a defect in service delivery (Brasil, 1990). Furthermore, under the Code of Civil Procedure, if subjective fault and a causal link between the act and the damage are confirmed, the unlawful conduct may be characterized as malpractice, given the lack of necessary competence and skill for proper execution of the procedure, potentially requiring the professional to compensate the owner for the damage caused (Brasil, 2015; Tremori, 2023).

Final considerations

It is concluded that Veterinary Forensic Medicine, when associated with necropsy examination, may contribute to the development of epidemiological statistical data related to different areas of Veterinary Medicine and, consequently, assist in the approach, advancement, and resolution of issues affecting both patients and veterinary professionals. The use of nylon plastic cable ties in spay and neuter surgeries is not permitted within the context of campaigns and mass sterilization programs, whereas such procedures performed in public and private hospital settings are not covered by this resolution. In this regard, it becomes relevant for the CFMV to consider the development of resolutions addressing the technical responsibility of veterinarians in surgical procedures in a broader context, with the aim of standardizing professional conduct and the materials permitted for use, as well as those whose application should be subject to stricter criteria, thereby minimizing interpretative ambiguities. Furthermore, the Regional Councils of Veterinary Medicine may expand inspection activities in spay and neuter campaigns and mass sterilization programs in order to ensure compliance with established regulations. &

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- **Ethical approval**: The necropsy procedure was performed following the signing of the Animal Body Donation Consent Form for Educational and Research Purposes by the responsible owner, as provided by the Veterinary Hospital of the Faculdades Metropolitanas Unidas.
- **Data and materials availability**: The methodology adopted by the Necropsy Service of the Veterinary Hospital of the Faculdades Metropolitanas Unidas follows the Ghon technique, characterized by the removal of organs in thoracic, abdominal, genitourinary, and nervous system blocks, followed by individual macroscopic examination of each organ. The materials used during the necropsy procedure in this case included a scalpel, anatomical and rat-tooth forceps, a Magaref knife, a costotome, and string. As complementary materials, a board and a ruler were used. Data regarding the animal's prior ante-mortem history were collected from the electronic record system used by the Veterinary Hospital (VetSmart). Ante-mortem and post-mortem photographic documentation of the animal was performed on the hospital premises using a mobile phone camera.
- **Author contributions**: SOUSA, M. D.: study conception, original draft writing, and editing; UEMURA, M. D.: review; DAMIANI, G. T.: methodology, validation, and writing (review).

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