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ULTRASOUND DIAGNOSIS AND SURGICAL EXTRACTION OF GRASS AWNS BY REDUCING SURGICAL TRAUMA IN DOGS

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Abstract

Vegetative foreign bodies, especially grass awns, are a common cause of paw lesions in dogs and can be difficult to differentiate from other inflammatory conditions. The aim of this study is to evaluate the utility of ultrasound in the diagnosis of interdigital vegetative foreign bodies and for guiding surgical interventions.

The study included 15 dogs with clinical signs of lameness and lesions at the level of the paw (swelling, erythema, fistulas with purulent secretion). All patients underwent high-resolution ultrasound examination, which allowed the identification of vegetal foreign bodies in the form of hyperechoic linear structures with hypoechoic core surrounded by hypoechoic inflammatory reaction. Subsequently, the foreign bodies were surgically removed through an incision located according to the ultrasound findings.

In all cases, ultrasound facilitated precise localization of the foreign body and contributed to successful surgical extraction, with no recurrences at postoperative re-evaluations. The results confirm that ultrasound is a fast, non-invasive and efficient diagnostic method, useful both for identifying vegetal foreign bodies and for planning minimally invasive surgical procedures in dogs with penetrating lesions.

Key words: Ultrasound, Grass Awns, Foreign Body, Dog, Surgery

Vegetative foreign bodies spiculate grasses are frequently encountered in dogs. Among these, grass awns are particularly important, having a morphological structure adapted to penetrate and migrate through tissues, causing intense inflammatory reactions, recurrent abscesses and chronic fistulas (Gnudi et al., 2005; Caivano et al., 2023).

Interdigital localization is one of the most common and problematic because the clinical signs are nonspecific. Dogs may present with swelling, erythema, pain on walking, and fistulas with purulent discharge, manifestations that can be confused with interdigital furunculosis or other inflammatory and infectious conditions (Miller et al., 2013; Fenêt et al., 2023). While furunculosis usually requires prolonged antimicrobial and anti-inflammatory treatment, vegetal foreign bodies require rapid identification and extraction to prevent recurrence and complications (Ihrke et al., 2017).

MATERIAL AND METHOD

The study included a group of 15 dogs, presented to our clinic with clinical signs suggestive of paw lesions: lameness, swelling, erythema, pain on support and recurrent fistulas with purulent secretion. In figure 1, 2 and 3 there

Lately, ultrasound has proven to be an essential method for the diagnosis of these lesions. It is a non-invasive and accessible technique that allows direct visualization of the foreign body, characteristically described as a linear hyperechoic structure associated with a hypoechoic inflammatory reaction of the adjacent tissues (Marino et al., 1995; Vignoli et al., 2004; Biretoni et al., 2016). Furthermore, ultrasound can be used to guide minimally invasive extraction, reducing the need for extensive surgical dissections and increasing the success rate of treatment (Caivano et al., 2014; Biretoni et al., 2017).

The aim of this study is to highlight the usefulness of ultrasound in the diagnosis of interdigital vegetal foreign bodies in dogs, based on our own clinical experience and comparison with data from the specialized literature.

are various examples of localisation of the grass awns. In one dog there are localized at the level of the 2nd and 3rd finger, in another at the level of the 5th finger and another one that is higher up at the level of the 3rd finger. History varied between dogs, but what they had in common was that they were walked in grass fields and that they started to limp afterwards. General status was never altered.

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All patients were clinically evaluated and underwent ultrasound examination and blood sampling before surgery.



Figure 1: Dog, grass awn between the 2nd and 3rd finger; B: Dog, grass awn at the level of the 5th finger; C Dog, grass awn at the level of the 3rd finger



Figure 2: Dog, grass awn at the level of the 5th finger;



Figure 3: Dog, grass awn at the level of the 3rd finger

Ultrasound examinations were performed using a Esaote My Lab 6 machine with a high-frequency linear probe (4–13 MHz), which allowed optimal resolution for superficial structures. Dogs were positioned in sternal or lateral recumbency, depending on the location of the lesion. Sedation was required in very aggressive dogs. The paw area was prepared by trimming and applying ultrasound gel. A probe rubber cover was used to have ultrasound gel between the probe and the cover. Upon touching the patient, the probe would be soft and reduce the discomfort. Also, by using this method, the curved surface of the fingers did not affect the image acquiring process.



Figure 4: Dog, 3 years old, female. Grass awn at the level of the 5th finger. The ultrasound appearance of a vegetal foreign bodies is linear, hyperechoic, often surrounded by a hypoechoic area corresponding to the inflammatory reaction

In figure 4 there is presented a grass awn at the level of the 5th finger. Proximal to the probe there is the ultrasound gel. The probe does not touch the skin, so the hardness of the probe dose not produce pain by pressing. The ultrasound appearance of a vegetal foreign bodies is linear, hyperechoic, often surrounded by a hypoechoic area corresponding to the inflammatory reaction and purulent content. These aspects are consistent with descriptions in the literature, where it has been demonstrated that ultrasound allows precise localization of the foreign body and its differentiation from other inflammatory processes, such as interdigital furunculosis (Gnudi et al., 2005; Fenêt et al., 2023).

After establishing the ultrasound diagnosis, all 15 dogs underwent surgery to extract the foreign body. The incision was made along the area identified by ultrasound, which allowed for rapid localization and complete removal of the grass awns, reducing tissue trauma and surgical time. Previous studies have shown that the use of ultrasound for preoperative identification or intraoperative guidance decreases the recurrence

rate and increases the chance of complete extraction (Caivano et al., 2014; Birettoni et al., 2017; Caivano et al., 2023).

RESULTS AND DISCUSSIONS

In all 15 dogs included in the study, ultrasound examination allowed for the identification of vegetal foreign bodies at the paw level. Ultrasound examination revealed linear, hyperechoic structures, with or without acoustic shadowing artifact, surrounded by a hypoechoic area suggestive of inflammatory reaction and purulent collection. In three cases, the formation of a drainage fistula communicating with the affected area was observed, an aspect subsequently confirmed during surgery.

Ultrasound examination allowed precise depiction of the location of the foreign body, which facilitated the choice of the optimal incision site and reduced the surgical time. In all cases, the foreign bodies were surgically removed, confirming their vegetal nature (grass awns).



Figure 5:A: Dog, 3 years old, female. 20 mm grass awn at the level of the 5th finger after it was surgically removed; B: Dog, 4 years old, male. 9 mm grass awn at the level of the 4th finger after it was surgically removed

Postoperatively, the evolution was favorable in all patients, with no recurrences at the re-evaluations performed every day for the first 3 days and then once more at 14 days. Our results are consistent with the observations reported in the specialized literature, where it has been demonstrated that ultrasound is a highly sensitive

method for identifying vegetal foreign bodies and that it contributes to therapeutic success by precise orientation of the surgeon (Marino et al., 1995; Vignoli et al., 2004; Birettoni et al., 2016; Fenêt et al., 2023).

CONCLUSIONS

The results obtained in this study confirm the importance of ultrasound examination in the diagnosis of interdigital vegetal foreign bodies in dogs. In all 15 cases investigated, ultrasound allowed the identification of the grass awn and the associated inflammatory reaction, which facilitated surgical localization and complete extraction.

The typical ultrasound appearance described in the literature consists of a hyperechoic, linear or fusiform structure, surrounded by a hypoechoic area corresponding to inflammation and purulent exudate (Gnudi et al., 2005; Vignoli et al., 2004). These characteristics were also found in our cases, confirming the value of the ultrasound exam for differentiating vegetal foreign bodies from other interdigital pathologies.

One of the main clinical difficulties is the differential diagnosis between plant foreign bodies and interdigital furunculosis. Both conditions can manifest with swelling, fistulas and purulent drainage, but only in the presence of a foreign body can ultrasound reveal the characteristic hyperechoic structure (Fenêt et al., 2023). This differentiation is essential, because furunculosis responds to long-term antimicrobial and anti-inflammatory treatments (Miller et al., 2013), while foreign bodies require prompt extraction to avoid recurrence.

The role of ultrasound not only in diagnosis but also in therapeutic guidance. The technique allows for incision planning and even minimally invasive extraction, in some cases through direct ultrasound guidance, reducing surgical trauma and recovery time (Caivano et al., 2014; Birettoni et al., 2017). In our study, the use of ultrasound to establish localization facilitated the surgical intervention, shortening the operating time and ensuring complete extraction of the foreign body in all cases with minimal trauma.

However, there are also limitations to the method. In situations where the foreign body is very small, deeply migrated, or surrounded by intense inflammatory reaction, ultrasound detection may be difficult (Birettoni et al., 2016; Caivano et al., 2023). In these cases, complementary imaging methods, such as computed tomography, can provide additional information (Della Santa et al., 2011).

Our results, correlated with data from the literature, support the idea that ultrasound should be considered the first-line method in the evaluation of dogs with interdigital lesions suspected of being a foreign body. The use of this technique increases diagnostic accuracy, guides surgical intervention, and improves prognosis.

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