CLINICAL REPORT

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Diagnostic aspects of equine laryngeal hemiplegia: a case report

Aspectos diagnósticos da hemiplegia laríngea equina: relato de caso

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ABSTRACT: Laryngeal hemiplegia, commonly known as roaring, is a condition of varying etiology by neuropathy of the recurrent laryngeal nerve. The hallmark clinical sign is an inspiratory noise, which may be associated with exercise intolerance and dyspnea. Diagnosis is typically confirmed through imaging tests, such as endoscopy, wle the differential diagnosis includes laryngeal dysplasia, a condition presenting with similar clinical signs and confirmed via ultrasonography. This report describes the case of right laryngeal hemiplegia in a horse and the subsequent differential diagnosis process. Endoscopic examination revealed significant asymmetric in the movement of the right laryngeal cartilage, confirming the diagnosis of laryngeal hemiplegia. Ultrasound of the right ventral proximal cervical region showed correct positioning of the dorsal cricoarytenoid muscle, ruling out was correctly positioned, ruling out the misalignment characteristic of laryngeal dysplasia. Based on these findings, we concluded that this case represented laryngeal hemiplegia.

KEYWORDS: recurrent laryngeal nerve; dorsal cricoarytenoid muscle; ultrasonography; endoscopy.

RESUMO: A hemiplegia laríngea ou "síndrome do cavalo roncador" é uma afecção de etiologia variada resultante de uma neuropatia do nervo laríngeo recorrente. Tem como sinal clínico característico a apresentação de ruído inspiratório, que pode vir acompanhado de intolerância ao exercício e dispneia. Para diagnosticar essa afecção se faz uso de exames de imagem como por exemplo a endoscopia. Como diagnóstico diferencial pode ser citado a displasia laríngea, que cursa com os mesmos sinais clínicos, porém a confirmação diagnóstica é dada pela ultrassonografia. Este relato descreve um caso de um equino apresentando hemiplegia laríngea direita, expondo a caracterização do diagnóstico diferencial. No exame endoscópico foi visto uma movimentação assimétrica bem marcada na cartilagem laríngea direita, corroborando para a suspeita de hemiplegia laríngea. E, a partir do exame ultrassonográfico da região cervical proximal ventral direita, não foi visualizado o posicionamento incorreto do músculo cricoaritenóide dorsal, que seria o achado característico para diagnóstico de displasia laríngea. Assim, diante das avaliações realizadas, concluiu-se que se tratava de um caso de hemiplegia laríngea.

PALAVRAS-CHAVE: nervo laríngeo recorrente; músculo cricoaritenoide dorsal; ultrassonografia; endoscopia.

INTRODUCTION

Laryngeal hemiplegia (LH), also referred to as recurrent laryngeal neuropathy, is the most prevalent disease affecting in larynx in horses. The condition leads to paresis or paralysis of one or both dorsal cricoarytenoid muscles, which, in turn, causes paralysis of the cricoarytenoid joint. This dysfunction disrupts the normal adduction and abduction of the arytenoid cartilages, negatively affecting vocal fold movement (Interlichia Junior, 2011).

As a result, horses experience dyspnea and exercise intolerance, with the hallmark sign being a distinctive audible inspiratory noise known as roaring. The condition arises from the incomplete opening of the arytenoid cartilages and vocal folds, which narrows the airway, increases inspiratory resistance, hampers gas exchange, and produces the characteristic roaring soind (Campos, 2014).

The primary cause of LH is unknown, but secondary neuropathy can result from equine adenitis; guttural pouch disorders; neoformations; abscesses; injuries caused by incorrect phenylbutazone administration (Freitas *et al.*, 2022); lead, organophosphate, or plant poisoning; and vitamin deficiency (Silva, 2020). LH is not associated with sex, breed, or age, although male English Thoroughbreds exhibit a higher incidence (Alberton; Belettini; Steiner, 2013). When the case is unidentifiable, the condition is termed idiopathic LH. It usually affects large breeds, particularly athlete horses with narrow chests and long necks over three years of age. Additionally, some studies report that approximately 61%

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of the offspring of stallions with LH will present the disease (Radostits *et al.*, 2021).

The diagnosis of this pathology includes imaging tests such as endoscopy, which provides morphological and functional evaluation of laryngeal structures and their grading into four levels of severity (Radostits *et al.*, 2021).

Ultrasonography is a valuable imaging tool for assessing the extraluminal anatomical structures of the laryngeal region (Chalmers *et al.*, 2006). In cases of LH, the primary ultrasonographic finding is increased echogenicity in the lateral cricoarytenoid muscle, which is considered both sensitive and specific for diagnosing this condition (Chalmers *et al.*, 2006).

Larynx palpation is another diagnostic method, used to detect muscle atrophy. The dorsal cricoarytenoid muscle is the main target for palpation, with atrophy indicated by a prominent muscular process, particularly on the left side. This prominence manifests as a distinct nodule located cranially to the dorsal edge of the thyroid cartilage on the affected side (Oliveira, 2013).

A differential diagnosis for LH is laryngeal dysplasia (LD), which shares the same clinical signs of abnormal breathing with inspiratory noise (Lane, 2007). Lane (2007) associated LD with defects in the fourth and sixth branchial arches, 62% of cases on the right side, 24% bilaterally, and 14% on the left side. Garrett *et al.* (2009) studying magnetic resonance imaging data from five cases of LD, reported various abnormalities in anatomical structures such as the hyoid bone, which differ from those observed in cases of LH.

Laryngeal ultrasonography is an auxiliary technique in the differential diagnosis of conditions such as LH or LD, particularly in cases where other dynamic tests cannot be conducted (Garret *et al.*, 2009). As reported by Garrett *et al.* (2009), ultrasound findings in cases of LD include an abnormal location of the lateral cricoarytenoid muscle between the thyroid and cricoid cartilages, and an abnormal extension of the thyroid cartilage dorsally to the lateral cricoarytenoid muscle and arytenoid cartilage. Ultrasonography, considered the gold standard for the diagnosis of LD, was used for differential diagnosis (De Clercq; Rossignol; Martens, 2018)

In horses with LD, endoscopic findings include partial or complete reduction of arytenoid abduction and are typically associated with vocal fold collapse. Changes such as dorsal displacement of the soft palate, aryepiglottic fold collapse, or central displacement of the dorsal aspect of the palatopharyngeal arch can also be identified in animals with LD (Garret *et al.*, 2009).

The aim of this case report is to present the endoscopic and ultrasonographic findings used as diagnostic methods for laryngeal hemiplegia (LH) in a horse exhibiting reduced adduction and abduction of the right laryngeal cartilage.

CASE REPORT

A 360 kg male mixed-breed horse with bilateral cryptorchidism was presented to the Veterinary University Hospital of the Federal University of Pampa – UNIPAMPA. The horse exhibited a scar approximately 15 cm in length on the right lateral cervical region, resulting from a perivascular administration of phenylbutazone into the external jugular vein. Although the horse was referred for a bilateral cryptorchidectomy, it displayed presented frequent fluctuations in respiratory rate changes of 36 bpm. After a few days in the stable, the horse developed clinical signs indicative esophageal compression (choke) following feeding. Attempts to relieve the obstruction through cervical massage were unsuccessful. Consequently, the horse was sedated with 0.5 ml of 1% detomidine for endoscopic removal of the impacted material. During the procedure, marked asymmetry in laryngeal movement was observed while advancing the endoscope.

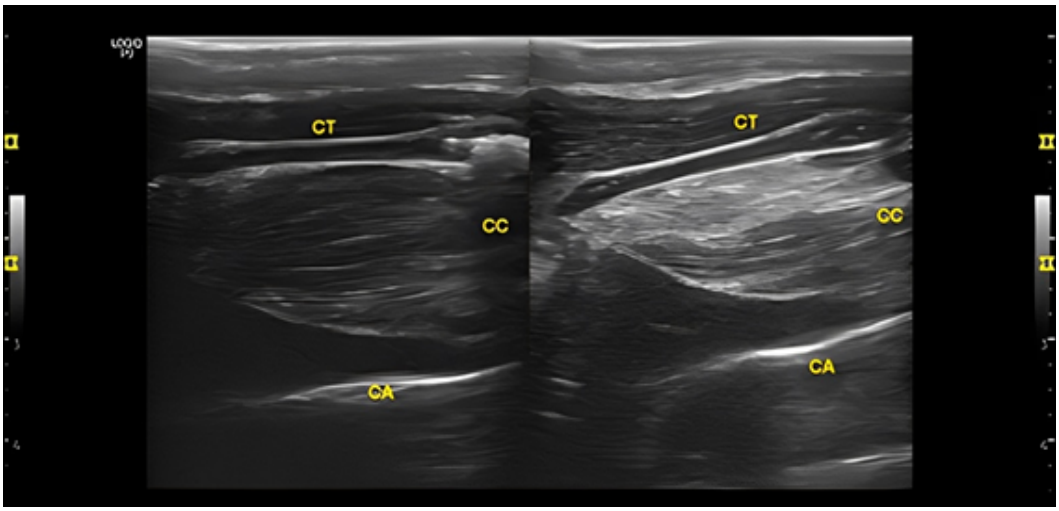
Following the procedure to address the choke, the larynx was thoroughly evaluated, revealing an absence of movement in the right arytenoid. This finding was suggestive of grade IV LH or LD. To further assess the condition, a bilateral laryngeal ultrasound was conducted. The examination showed an increase in echogenicity of the right lateral cricoarytenoid muscle (Figure 1) compared to the contralateral side. The other structures evaluated, including the arytenoid, thyroid, and cricoid cartilages, appeared normal in both ultrasound appearance and anatomical location. The combination of historical data, clinical signs, and endoscopic findings supported the diagnosis of right LH.

In a study by Cramp and Derksen (2009), approximately 64% of horses displayed some degree of laryngeal cartilage asynchrony during movement, with 25% exhibiting severe asymmetries that were linked to decreased performance. Most cases of LH affects the left side, with only 2% of cases involving the right side.

Freitas *et al.* (2022) reported that perivascular phenylbutazone administration leads to tissue necrosis. In the case presented, the improper administration of this drug likely responsible for the extensive scarring and history of necrosis observed in the right neck region.

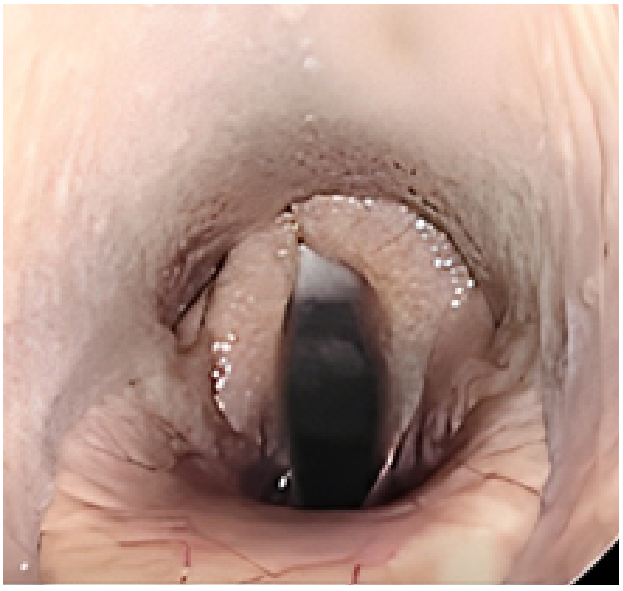
Additionally, the animal exhibited an increase respiratory rate, which, according to Herde *et al.* (2001), is an important clinical sign in cases of LH. Unlike the findings of Campos (2014), the reported animal produced no inspiratory noise, a typical clinical sign of LH. The absence of this sign may be attributed to lack of exercise, as physical activity increases the inspiratory effort, consequently amplifying the noise.

Endoscopic examination revealed marked asymmetric movement of the laryngeal cartilages, with the right arytenoid cartilage being nearly immobile during both inspiration and expiration (Figure 2). Resting endoscopy is a common method for diagnosing LH and is often combined with a "slap test" to stimulate arytenoid movement (De Clercq; Rossignol;



Source: author's collection.

Figure 2. Longitudinal ultrasound image of the larynx comparing the left (A) and right sides (B). A: cricoarytenoid (CC) muscle and the preserved thyroid (CT) and arytenoid (CA) cartilages; B: increased echogenicity of the right CC muscle compared to the normal contralateral one and preserved CT and CA.



Source: author's collection.

Figure 1. Resting endoscopy image showing a smaller opening of the right arytenoid compared to the contralateral one.

Martens, 2018). Due to the rarity of right LH, it is essential to utilize diagnostic tests that provide comprehensive data to ensure an accurate diagnosis.

Ultrasonography was first described as a diagnostic method for LH by Chalmers *et al.* (2006). Garrett *et al.* (2009) reported that ultrasound findings in animals with LH may include the absence of the cricothyroid joint, dorsal extension of the thyroid cartilage on the affected side, and abnormal placement of the lateral cricoarytenoid muscle, which is visualized in the space between the thyroid and the cricoid cartilage rather than being positioned deep to the caudal side of the thyroid cartilage. Ultrasound examination reveals specific characteristics in horses with LH, such as increased echogenicity of the dorsal and lateral cricoarytenoid muscles compared to the contralateral side. This increased echogenicity results from the replacement of normal muscle tissue with fibrous tissue and fat due to denervation and muscle atrophy (Tullock; Perkins, 2015).

Given the similar clinical presentation and endoscopy findings between laryngeal dysplasia (LD) and laryngeal hemiplegia (LH), ultrasound plays a crucial role in distinguishing between the two conditions. In this case, no ultrasonographic changes indicative of LD were observed, leading to the confirmation of LH based on the association of resting ultrasound and endoscopic findings.

CONCLUSIONS

Based on imaging tests, particularly the combination of endoscopy and laryngeal ultrasonography, this case was diagnosed as laryngeal hemiplegia (LH), with the hypothesis of laryngeal dysplasia (LD) ruled out. Additionally, we suggest that the recurrent laryngeal nerve neuropathy may be associated with injury resulting from the improper administration of phenylbutazone.

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