

Guttural pouch empyema in a Mangalarga Marchador filly: Case report

Empiema de bolsa guttural em potra Mangalarga Marchador: Relato de caso

Empiema de bolsa guttural en una potranca Mangalarga Marchador: Reporte de caso

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Abstract

Guttural pouch empyema is usually a consequence of upper respiratory tract infections, especially those caused by *Streptococcus equi*. In adult horses, empyema is a common disease, whereas considered rare in foals. The aim of this work was to report a case of unilateral guttural pouch empyema in a filly, with a focus on diagnostic and treatment approaches. A 1-month-old filly, 68 kg, Mangalarga Marchador, was admitted because of respiratory distress and enlargement caudally in the head. Clinical examination revealed dyspnea, dysphagia, lymphadenopathy, unilateral enlargement in the retropharyngeal area, and mucopurulent nasal discharge. Further, endoscopic examination confirmed the presence of purulent material inside the left guttural pouch and a diagnosis of empyema was arrived at. Drainage was performed surgically, a catheter was inserted for guttural pouch lavage. The animal received bromexin, dexamethasone, flunixin meglumine, ceftiofur, probiotics, vitamin complexes, and ringer lactate solution. Hematological evaluation performed every 24-72h, showed a decrease in total leukocytes, fibrinogen, platelets, total plasma protein, hematocrit, hemoglobin, and erythrocytes. Eleven days after drainage, the filly's clinical condition was stable and the wound has healing. The animal was discharged following a good prognosis. Differential diagnoses can include other respiratory diseases, such as guttural pouch tympanism, strangles, and *Rhodococcus*, which are excluded due to the clinical signs and complementary examinations. In the present case early diagnosis, based on physical examination, hematological parameters, and radiography, combined with adequate treatment methods, including surgical procedures, lavages, antibiotics, and anti-non-steroidal inflammatory therapy, contributed to resolving the guttural pouch empyema in the filly.

Keywords: Purulent; Guttural pouch drainage; Respiratory; *Streptococcus equi*; Strangles.

Resumo

Empiema da bolsa gutural é geralmente uma consequência de infecção do trato respiratório superior, especialmente por *Streptococcus equi*. Em equinos adultos, o empiema é uma doença comum, enquanto em potros é considerada rara. O objetivo deste trabalho foi relatar um caso de empiema de bolsa gutural unilateral em potra Mangalarga Marchador, com foco nos métodos de diagnóstico e tratamento. Uma potra, 1 mês de idade, 68kg, Mangalarga Marchador, foi atendida devido a desconforto respiratório e aumento na região da cabeça. Ao exame clínico, notou-se dispneia, disfagia, linfadenopatia, aumento unilateral em região retrofaríngea, secreção nasal mucopurulenta. O exame endoscópico confirmou presença de material purulento no interior da bolsa gutural esquerda e diagnóstico de empiema. A drenagem por cirurgia foi realizada e um cateter foi mantido para lavagem da bolsa gutural. O animal recebeu bromexina, dexametasona, flunixinina meglumina, ceftiofur, probióticos, complexo vitamínico e solução de ringer lactato. A avaliação hematológica foi realizada cada 24-72h, mostrando diminuição de leucócitos totais, fibrinogênio, plaquetas, proteína plasmática total, hematócrito, hemoglobina e eritrócitos. Onze dias após drenagem, o quadro clínico da potra era estável e a ferida cicatrizando adequadamente. O animal recebeu alta, com prognóstico favorável. Os diagnósticos diferenciais incluem doenças respiratórias, destacam-se timpanismo de bolsa gutural, adenite, rhodococcus, sendo essas excluídas devido aos sinais clínicos e exames complementares. O diagnóstico precoce, baseado no exame clínico, hematológico e radiográficos, aliado a métodos de tratamento adequados, baseados em procedimento cirúrgico, lavagem da bolsa gutural, antibioticoterapia e anti-inflamatórios não-esteroidais, contribuíram para resolução do empiema de bolsa gutural na potra.

Palavras-chave: Adenite; Drenagem bolsa gutural; Purulento; Respiratório; *Streptococcus equi*.

Resumen

Empiema de la bolsa gutural es consecuencia de infección del tracto respiratorio superior, especialmente por *Streptococcus equi*. En los caballos adultos, empiema es la enfermedad más común, mientras que en potros es rara. Apuntamos reportar un caso de empiema de bolsa gutural unilateral en potra, enfocándonos en los métodos de diagnóstico y tratamiento. Una potranca, 1 mes edad, 68 kg, Mangalarga Marchador, fue atendida por dificultad respiratoria y agrandamiento caudal de la cabeza. Durante el examen clínico se constató disnea, disfagia, adenopatías, agrandamiento unilateral en zona retrofaríngea, secreción nasal mucopurulenta. El examen endoscópico confirmó la presencia de pus dentro de la bolsa gutural y los diagnósticos de empiema. Se realizó drenaje por cirugía y se mantuvo el catéter en bolsa para lavado. La potranca recibió bromexina, dexametasona, flunixinina meglun, ceftiofur, probióticos, complejo vitamínico y solución de ringer. Se realizó evaluación hematológica cada 24-72h, observándose disminución de leucocitos totales, fibrinógeno, plaquetas, proteínas plasmáticas totales, hematocrito, hemoglobina y eritrocitos. Once días después del drenaje, el estado clínico de la potranca era estable y la herida cicatrizaba adecuadamente, siendo el paciente dado de alta, con buen pronóstico. Los diagnósticos diferenciales incluyen enfermedades respiratorias, como timpanismo de la bolsa gutural, adenita, rodococos, siendo estas enfermedades excluidas por signos clínicos y exámenes complementarios. El diagnóstico precoz, basado en el examen físico, hematológico y radiografía, combinado con métodos de tratamiento adecuados, basados en procedimiento quirúrgico, lavados, terapia antibiótica y antiinflamatoria no esteroideo, evoluciona para resolver el caso de empiema de bolsa gutural en la potranca.

Palabras clave: Adenitis; Drenaje de la bolsa gutural; Purulenta; Respiratorio; *Streptococcus equi*.

1. Introduction

Respiratory diseases commonly occur in young horses, and the major causative agents include respiratory viruses, such as influenza and herpesvirus, and bacteria, such as *Rhodococcus equi* and *Streptococcus equi* (Sellon, 2001). In southern Brazil, studies have shown that musculoskeletal alterations are the leading cause of diseases in thoroughbred foals under 6 months of age, followed by respiratory disorders (Frey Jr, 2006).

Empyema is an upper respiratory tract disease characterized by the accumulation of exudate within the guttural pouches, which is usually a sequela caused by *Streptococcus equi* infection, rupture of abscessed lymph nodes, or guttural pouch tympanism (Ainsworth & Cheetham, 2010; Freeman, 1980; Perkins et al., 2003; Pusterla et al., 2006). The disease usually affects adult horses and is rare in foals (Ainsworth & Cheetham, 2010).

The main clinical signs include fever, apathy, retropharyngeal lymph node abscess, swelling in the guttural pouch region, and unilateral or bilateral mucopurulent nasal discharge (Ainsworth & Cheetham, 2010).

Diagnostic methods include radiography (opacity within the guttural pouch), endoscopy (purulent material within the pouch), while percutaneous centesis, and aspiration of material from the guttural pouch through the pharyngeal opening are the common treatment approaches (Ainsworth & Cheetham, 2010; Freeman, 2015).

In addition to supportive therapy, the treatment comprises the administration of systemic antibiotics and anti-inflammatory drugs (Freeman, 2015). Local administration of penicillin may improve the treatment effectiveness (Kendall et al., 2016). A combination of penicillin and gelatin can be instilled through a catheter inserted under endoscopic guidance into the guttural pouch (Ainsworth & Cheetham, 2010). If clinical treatment is ineffective or when thickened material is present within the pouch, surgical treatment involving opening, draining, and washing the guttural pouch is recommended (Ainsworth & Cheetham, 2010). The choice of treatment must be judicious to overcome the main complications arising due to delay in the resolution of empyema. These include progressive weight loss due to dysphagia, abscessation in lymph nodes in other regions, dyspnea, and even sepsis.

As guttural pouch empyema is uncommon in foals, the objective was to report a case of unilateral guttural pouch empyema in a 1-month-old Mangalarga Marchador filly, as well as diagnostic approaches and therapeutic management.

2. Case Report

A 1-month-old Mangalarga Marchador filly was attended in a veterinary hospital located in the city of Guarimirim, Santa Catarina state, Brazil. The animal weighed 68 kg and had an adequate body condition score, classified as 6 on a scale from 1 to 9 (Henneke et al., 1983).

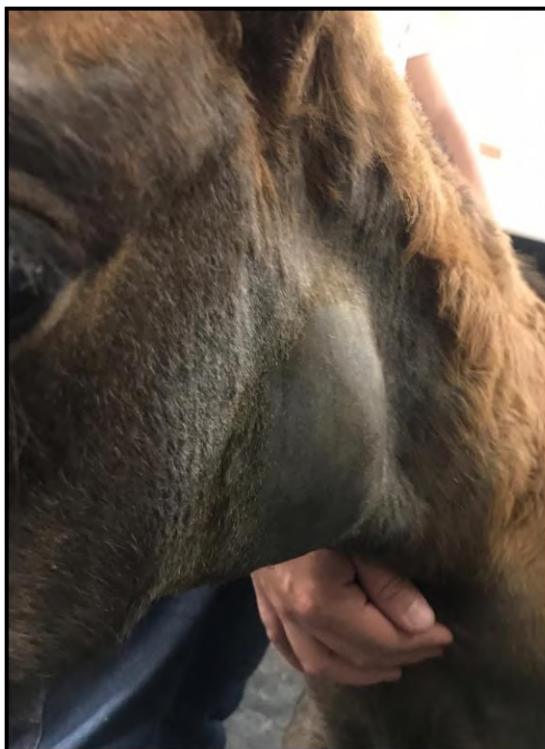
During anamnesis, the owner reported a recent outbreak of equine adenitis on his farm, alerting that the foal had exhibited clinical signs compatible with the disease and received antibiotic therapy. After 2 weeks, the owner reported that the filly exhibited a growth in the parotid region and difficulty in swallowing milk, with milk extravasation through the nostrils. Due to the worsening clinical signs, the animal was treated on the farm by a veterinarian and was diagnosed with guttural pouch empyema through radiographic examination. Treatment with non-steroidal anti-inflammatory and antibiotics were instituted (the owner was not able to inform drug and dosage). However, treatment was not effective and the animal was referred to a veterinary hospital for evaluation.

Physical examination revealed dyspnea, dysphagia, lymphadenopathy (Figures 1 and 2), distention and painful sensation in the parotid region, stertorous breathing, unilateral mucopurulent nasal discharge (Figure 3), rectal temperature of 38.8 °C, heart rate of 60 bpm, and respiratory rate of 48 breaths per minute.

Hematological examination revealed leukocytosis, hyperfibrinogenemia, thrombocytosis, hyperproteinemia, and polycythemia (Table 1), suggesting intense dehydration and severe infectious process.

Endoscopic examination of the airways revealed that the right guttural pouch was unaffected (Figure 4), while the left contained purulent material (Figure 5), confirming the diagnosis of guttural pouch empyema.

Figure 1. Volume increase in the region of guttural pouch in the filly – left side.



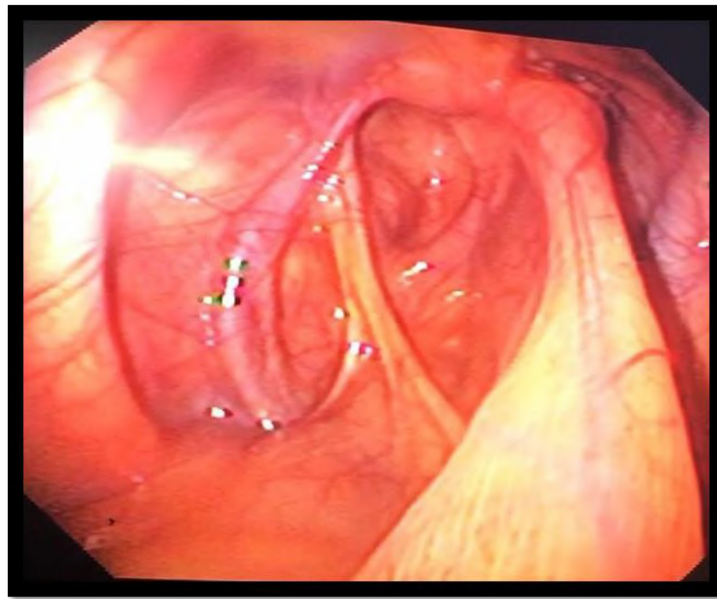
Source: Own authorship.

Figure 2. Purulent nasal secretion and volume increase in the region of the guttural pouch on the left side.



Source: Own authorship.

Figure 3. Guttural pouch endoscopy on the right side in the filly, without alterations.



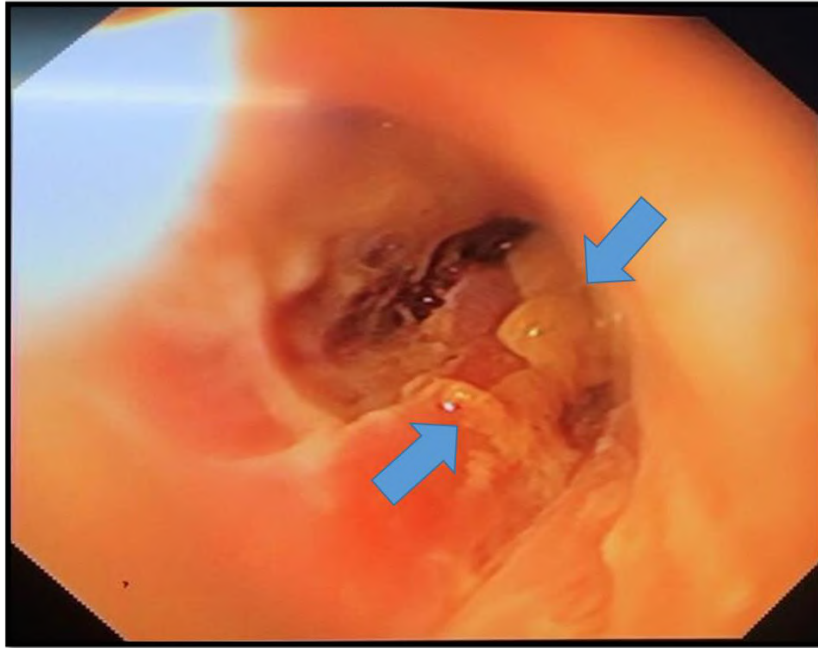
Source: Own authorship.

Table 1. Hematological evaluation of a 1-month-old Mangalarga Marchador filly with unilateral guttural pouch empyema.

Parameter	D0	D2	D4	D7	D10
Erythrocytes ($10^6/L$)	10.4	8.6	9.3	10.2	8.8
Hemoglobin (g/dl)	12.4	10.1	10.9	11.8	10.4
Hematocrit (%)	38	28	32	33.8	31
MCV (fL)	34	33.3	33.5	33.7	33
MCH (pg)	11.9	11.6	11.6	11.8	11.8
MCHC (g/dL)	35	34.9	34.7	34.9	35
TPP (g/dL)	9	8.2	7.2	*	6.6
Platelets ($10^3/L$)	584	480	536	459	454
Leukocytes (μL)	54 200	21 500	30 500	21 900	18 100
Fibrinogen	1000	600	400	*	600

*Not measured. MCV: Mean corpuscular volume. MCH: Mean corpuscular hemoglobin. MCHC: Mean corpuscular hemoglobin concentration. TPP: Total plasma protein. Source: Own authorship.

Figure 4. Endoscopy evaluation of the left-sided guttural pouch in a filly with purulent content (blue arrow).



Source: Own authorship.

Figure 5. Washing of the left side guttural pouch in the filly.



Source: Own authorship.

Surgical treatment by fenestration of the guttural pouch with access through the Viborg's triangle was recommended and performed. The animal was kept in a quadrupedal position and sedated using intravenous (IV) detomidine (0.01 mg/kg). Lidocaine was used for local anesthesia. The animal had severe dyspnea during the surgical procedure, necessitating support with oxygen therapy via a nasal tube. A skin incision was made on the left side in the parotid region, followed by incision of

the guttural pouch with extravasation of caseous and purulent material.

The material was removed using tweezers and the guttural pouch was washed with diluted povidone-iodine (1%) using a urinary catheter. A catheter was kept inside the pouch and washing was performed twice a day (Figure 6). After each wash, the surgical wound was cleaned, antibiotic spray (rifampicin) was applied, and a bandage was positioned over the surgical wound (Figure 7).

Figure 6. Postoperative of guttural pouch drainage in the filly through the Viborg triangle access.



Source: Own authorship.

Figure 7. Eleven days after the surgical opening of the guttural pouch in the filly, the wound healed well.



Source: Own authorship.

Immediately after surgery (D0), IV bromhexine hydrochloride (75 mg), IV dexamethasone (0.01 mg/kg), IV flunixin meglumine (1.1 mg/kg), intramuscular (IM) ceftiofur (2.2 mg/kg), and oral (VO) probiotic and mineral amino acid vitamin supplements were administered. Parenteral hydration with IV Ringer's lactate solution was administered as needed.

Hematological follow-up was performed every 48–72 hours to assess the course of the disease and response to treatment (Table 1). During hospitalization, a decrease in total leukocyte count, fibrinogen, platelets, total plasma protein, hematocrit, hemoglobin, and erythrocytes was observed, although these parameters still remained above the reference limits (Harvey, 1990; Santos et al., 2014).

At 24 hours (D1) following guttural pouch drainage, the animal exhibited apathy, dysphagia, milk extravasation through the nostrils, and painful sensation in the parotid region. As a supportive therapy, VO probiotic (20 g) and IV hyperimmune plasma (1 L) were administered.

Administration of VO probiotic (BID) and IM ceftiofur (2.2 mg/kg, SID) was maintained until D4, when the animal presented with diarrhea. Ceftiofur was replaced by IM ampicillin (15 mg/kg, SID) and the dose was maintained up to D8.

Local inflammation was observed on D3 and guttural pouch lavage was performed twice a day with procaine penicillin (20.000 IU/kg) and bromhexine hydrochloride (75 mg) diluted in 1 L of saline solution. Washing was performed until no purulent content could be observed (D7).

During hospitalization, the animal had episodes of stertorous breathing, which were more frequent after the end of antibiotic therapy (D8). VO acetylcysteine (10 mg/kg, SID) was administered from D8 onwards until D10.

At 11 days after the surgical procedure (D11), the animal was stable and the wound was healing properly. Considering the favorable prognosis, the animal was discharged from the Veterinary Hospital.

3. Discussion

Tympany is the most common disease of the guttural pouch in foals, while empyema is usually observed in adult horses (Blazyczek et al., 2004). *Streptococcus equi* is responsible for most of the guttural pouch infections that can result in empyema (Freeman, 2015; Perkins et al., 2003; Pusterla et al., 2006).

Ingestion of high quality colostrum is essential for the foal's passive immunity, to prevent infectious diseases specially during neonatal period (Guigère & Polkes, 2005). However, challenges posed by highly contaminated environments could overwhelm the immune response of a young animal. In the present report, the animal belonged to a farm with a recent outbreak of equine adenitis. Purulent secretions from other horses is the main cause of environmental contamination and adenitis dissemination. Guttural pouch empyema is often a sequela of upper airway infections and can occur due to rupture of abscessed retropharyngeal lymph nodes into the pouch (Ainsworth & Cheetham, 2010).

Diagnosis was based on physical examination and results of complementary imaging tests. Endoscopy is considered the main diagnostic tool, allowing the visualization of purulent content as well as evaluation of the guttural pouch interior (Freeman, 2015).

Hematological examination allows monitoring of the course of the disease and treatment response. In the present report, intense leukocytosis, hyperfibrinogenemia, thrombocytosis, hyperproteinemia, and polycythemia were observed before the surgical treatment. Total leukocyte count, fibrinogen, platelet count, total plasma protein, hematocrit, hemoglobin, and erythrocyte count decreased throughout the treatment, but remained above the reference values for young horses (Harvey, 1990; Santos et al., 2014). Thrombocytosis results from inflammatory and infectious processes (Weiss et al., 2010). Leukocytosis suggests infection and/or severe inflammation (Weiss et al., 2010). Hyperfibrinogenemia indicates an ongoing inflammatory process and dehydration (Weiss et al., 2010). Therefore, the results of hematological examinations indicated the presence of an infectious and inflammatory process, which gradually improved with treatment.

Surgical approach to the guttural pouch can be accomplished by three techniques: access through hyovertebrotoomy (recommended for removal of chondroids, purulent material, and pouch mycosis), Whitehouse access (recommended for tympany and pouch mycosis associated with epistaxis), and access through the Viborg's triangle (recommended for empyema and tympany (Thomassian et al., 2001). In the present report, we opted for surgical treatment with access through the Viborg's triangle due to the severity of clinical signs and presence of purulent content inside the guttural pouch.

After surgery, the guttural pouch was irrigated with antiseptic solution until the discharge was non-purulent. Diluted povidone-iodine (1%) is effective, but it can be inactivated by the exudate and cause local chemical inflammation (Chambers, 2009). Other solutions such as saline and Ringer's lactate can be used, although care must be exercised while applying irritating solutions, which can compromise the nerves near the guttural pouch (Chambers, 2009).

Mucolytic agents such as bromhexine hydrochloride reduce the viscosity of the secretions, thereby aiding in expectoration. Dexamethasone has an anti-inflammatory effect and aids in reducing lung damage (Reis et al., 2016). Probiotics are live microorganisms used to help maintain the health of intestinal microbiota (Schoster, 2018), especially in horses undergoing antibiotic therapy. Hyperimmune plasma is usually administered in the foal's first days of life, but it can also be used as an adjuvant in infectious conditions (Koterba et al., 1985).

Ceftiofur is recommended during the treatment of severe respiratory infections, as it is a third-generation cephalosporin resistant to β -lactamase (Ainsworth & Cheetham, 2010). However, the animal presented with diarrhea in the present case, probably induced by ceftiofur, which has a broad spectrum of action and interferes with the microbiota of the gastrointestinal system. Subsequently, ceftiofur was replaced by ampicillin. At the end of antibiotic therapy, the animal exhibited episodes of stertorous breathing and was administered acetylcysteine, which has mucolytic and fluidizing effect on the secretions. Foals with guttural pouch empyema can die from septic shock, which can occur at any time, especially due to

the stress of physical restraint while performing the treatment (Dias et al., 2015). Drug administration is considered frustrating due to high cost, long duration, and low efficacy.

Due to the increased tissue volume in the guttural pouch region, it is important to establish a differential diagnosis of other respiratory diseases, especially pouch tympany. Tympany involves presence of excess gas inside the pouch, with a fluctuating characteristic on palpation that can also be detected with radiographic examination. Other differential diagnoses include influenza (serous nasal discharge, high morbidity mainly in adult animals, greater occurrence in winter, transient and self-limiting), adenitis (purulent secretion in the nostrils, high morbidity mainly in adult animals, dysphagia, fever, dyspnea, submandibular lymph node enlargement, greater occurrence in winter), and rhodococcosis (common in foals especially between 3–6 months of age, fever, dyspnea, lung lesions detected by ultrasound and radiographic examinations, sepsis).

4. Conclusion

In horses, the diagnosis of respiratory diseases under field conditions can be challenging and often requires the use of complementary examinations. Severe cases, especially those that compromise respiratory capacity, need intensive care and constant reassessment. In the present case, a definitive diagnosis was based on physical, hematological, and radiographic examinations. Frequent assessment of the animal combined with appropriate surgical and medical treatment resulted in a favorable evolution of guttural pouch empyema in the foal.

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